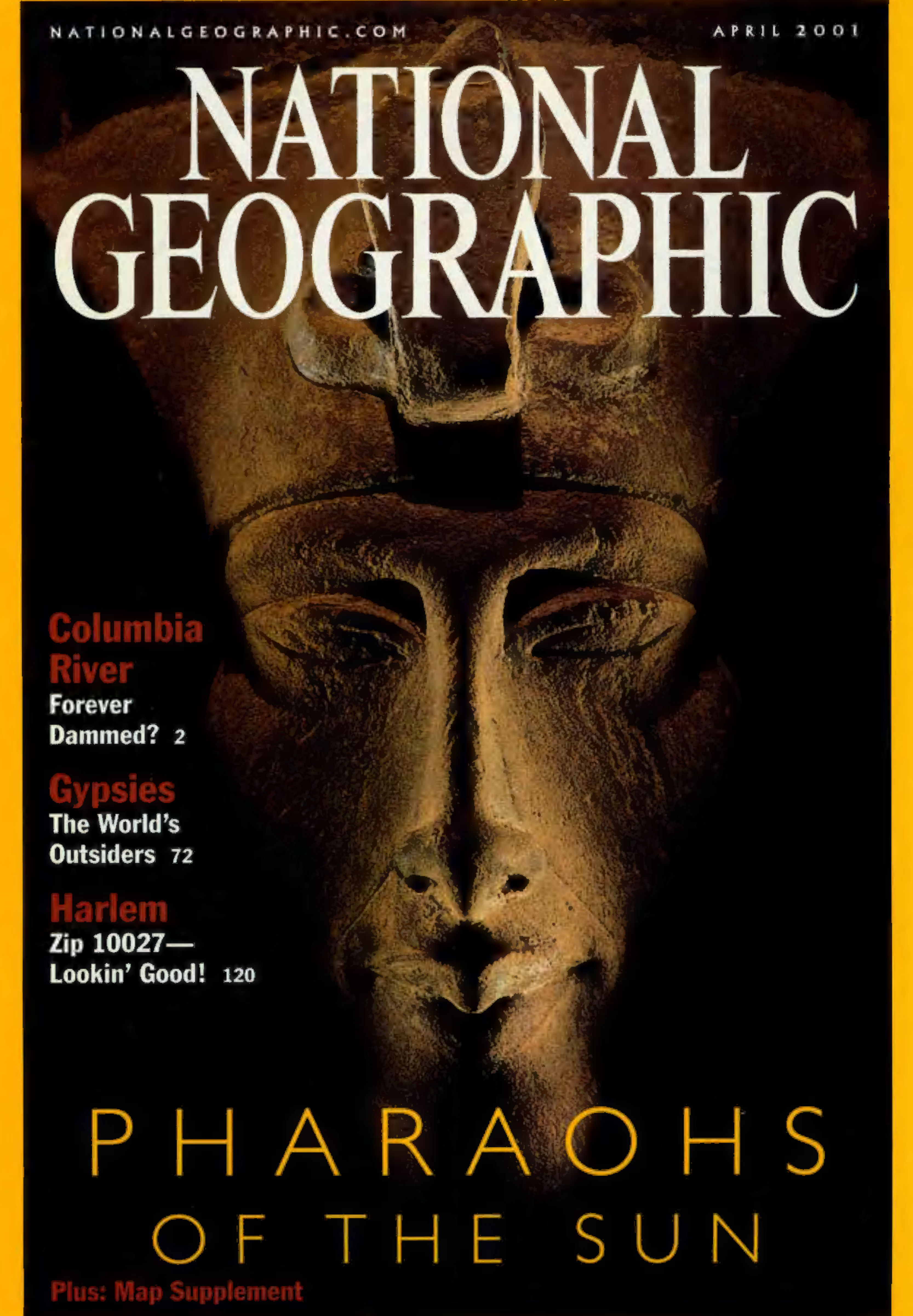


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APRIL 2001

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Columbia River

Forever
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Harlem

Zip 10027—
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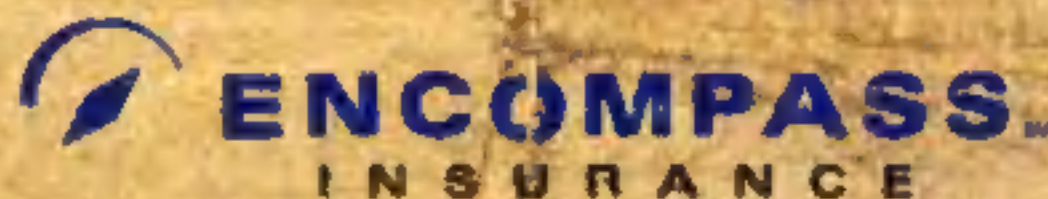
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Gypsies—72

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THE COVER

A sandstone image found at Karnak unveils the mysterious Akhenaten—a defiant ruler in Egyptian history.

PHOTOGRAPH BY
 KENNETH GARRETT

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JIM RICHARDSON

No river in the United States has been more bent to the will of man than the Columbia in the Pacific Northwest, and no river stirs more controversy. Some 250 dams on its tributaries and 14 on its main stem, crowned by the massive Grand Coulee, have for decades provided affordable electricity to the region (and, in time of need, to California). They irrigate a vast agricultural economy. But the dams are also largely to blame for preventing 99 percent of Columbia Basin salmon from returning to their ancestral spawning streams. The very survival of these magnificent fish is in doubt. And so the debate: Should some of the dams come down?

There is no dam on at least one stretch of the Columbia, the Hanford Reach, where the river runs free. Free, but its bank tainted with radioactive tritium, strontium 90, and other contaminants from an old plutonium production site (above). Cleanup is under way, but long-term uncertainties remain.

Our in-depth report this month by Fen Montaigne and photographer Jim Richardson is an example of one of the things this magazine does best—bringing context to complex issues. ABC News thought highly enough of how we cover such a story to feature it on an upcoming *Nightline* program.

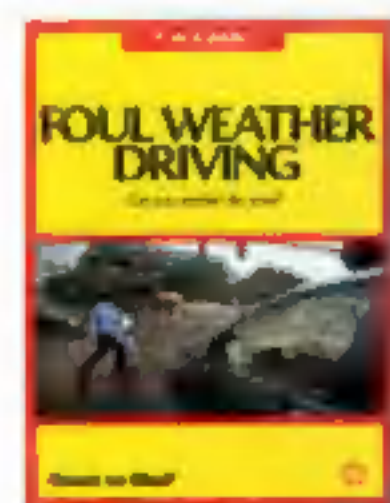
There are no easy choices along the Columbia River. Well-meaning people on all sides are frustrated, and so too, presumably, are the salmon. To paraphrase Scottish poet Robert Burns: The best laid plans of fish and men oft go astray.

Bill Allen



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Forum

December 2000

The polar bear cubs that romped across the pages of the December issue charmed our readers so much that one proclaimed the cover the "magazine's picture of the year." Others praised "In Search of Lake Wobegon."

"This article epitomizes what is best about the magazine," wrote one member. "The love of a place for what it is—unique and at the same time part of something universal."



Fiordland

As a misplaced Kiwi, I found your article on Fiordland extremely heartwarming yet also heartbreaking. There are few places in the world that can match the beauty of Mitre Peak looking over Milford Sound or the dolphins racing below the peaks in the dark water. I only wish that my European ancestors had not introduced those species that are destroying the natural splendor of the region. Money is extremely tight in New Zealand, yet most of us do have substantial pride in our homeland and do not wish to lose any of our native species.

SONJA WESTHASSEL
Oceanside, California

In January 1984 I was tramping in Fiordland National Park when the worst flooding in recorded history took me by surprise. I found myself with water pouring into my tent at three in the morning. I had to wait until daylight, ditch my pack in a tree, walk and swim to the fiords, which were about a mile away, then walk 15 miles to Monowai Village—at times in mud up to my chest. I learned what rain means in the fiords the hard way.

JIM PEACOCK
Vassalboro, Maine

First Americans

I realize that Arctic archaeology presents its own challenges, but the Inuit didn't even get a mention in the article or the supplement map.

BRIAN GENN

Pender Island, British Columbia

The archaeological record suggests that the ancestors of the Inuit arrived from northeast Asia thousands of years after the time period covered in the article.

We tend to view glaciers in the context of Antarctica or Greenland, as barren white mountains of densely packed snow that appear lifeless and would not support a migration of peoples from Siberia to America. A better way to understand glaciers would be to roll a snowball over loose soil and see the considerable adherence. Soils formed from glacial till appear to have supported vegetation comparable to permafrost taiga for perhaps a thousand years. With this in mind, polar migration would seem more achievable.

JEFFREY L. HAMMES
Madison, Wisconsin

I found this article intriguing, but I saw no reference to the "Mongoloid spot" found at the



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RICHARD OLSENIUS

Lake Wobegon

I'd like to offer this hunch as to why Garrison Keillor's sense of alienation was so strong during his Stearns County residency. It struck my six-foot-plus sensibilities as understandable but naive that Mr. Keillor, a miniaturist at heart, overlooks the physical fact that he is a pretty big guy, maybe even a little funny looking. We know

Keillor the Gentle Giant. But law of the jungle applies to the hyperborean steppes of Minnesota. Maybe that big fella with the bushy eyebrows and lugubrious demeanor at the end of the bar with the beehive of creation humming

inside him just scared everybody. What tales did Stearns County folks concoct about the tall brooding stranger up at all hours in the Hoppe place?

FRANKLIN CRAWFORD
Ithaca, New York

I was so enthralled by this article that I decided to visit your website for the first time to see if there was more, and

there was much more. The "Sights and Sounds" presentation was excellent. There is something magical about Keillor's voice reading the story.

DARYL GRAY
Montreal, Canada

Congratulations on your decision to use black-and-white photos for "In Search of Lake Wobegon." The words and images support each other beautifully. They make me want to dig out the trays and print up some old glass negs or some 4x5 B&W takes of years ago. Now I know why my dog stopped so often at the top of our hill when we hunted. He was enjoying the view in black and white.

METRO LESHAK
Northampton, Pennsylvania

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base of the spine of newborns and reflective of Asiatic origins. In my experience these spots vary in size and usually disappear within the first few years of life. They are present in the Inuit and North, Central, and South American Indians. During my practice of medicine in the jungles of Mexico, where the population was less influenced by outsiders, all the babies had the Mongoloid spot.

HAROLD M. JANECEK, M.D.
La Grange Highlands, Illinois

Because skin is rarely present on ancient human remains, scientists cannot know if early Americans

▶ LETTER TO THE EDITOR

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had this pigmentation, which is also common among children of African ancestry.

The Americas Map

On your map of the Americas you included many small cities in Argentina, but you did not include the fourth largest city in that country, Mendoza, which has a metropolitan population of about one million people. Mendoza is the heart of a large wine-production area, and it is noted for its rich history. It is the second oldest city in Argentina, and José de San Martín, Argentina's national hero, chose it to gather and train the army that would defeat the Spanish army in Chile and Peru.

EDUARDO BRINGA
Charlottesville, Virginia

Looking at Canada's Northwest Territories on the map, I spotted Pine Point. In its heyday it was one of the largest towns in the

NWT and held North America's largest open-pit mine. That ended in 1986 when the mine shut down and the town was decommissioned. All that remains is paved roadbeds and scars from the mine. No buildings. No population.

MIKE COUVRETTE
Fort Smith, Northwest Territories

Thank you for your excellent map, which shows the true relative landmasses of the countries in South and North America. However, in the same edition in which you highlight the debut of the Brazilian edition of the GEOGRAPHIC, you name and outline all the states and provinces of the United States and Canada but fail to do the same for Brazil and Mexico. About 300 million potential Brazilian and Mexican readers might appreciate seeing their states on the map.

BRUCE HOROWITZ
Quito, Ecuador



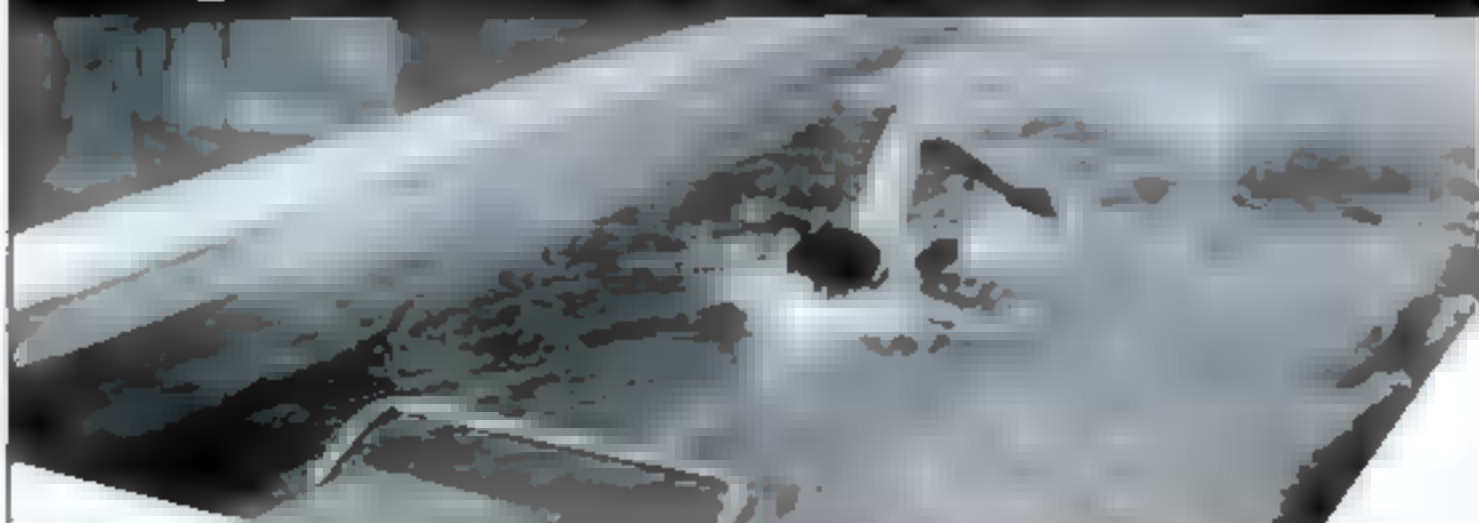
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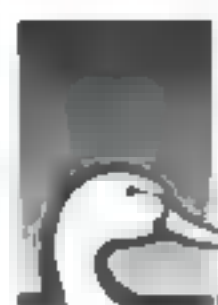
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—Aldo Leopold



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Blue Nile

It is only partly correct that dams haven't been built on the Blue Nile because of the "high cost and politics." I speak from the experience of having been in Ethiopia 40 years ago as a part of a foreign aid mission. The Ethiopians wanted to rush us into building a dam. We hesitated for two reasons. There was the question of whether Ethiopia had the right to dam up water that was essential for Sudan and Egypt. Also, our engineers insisted on hydrological studies over a period of years to determine the most feasible construction. When we wouldn't do it without the studies, they gave a contract to the Yugoslavians. They quickly built the dam and just as quickly it disintegrated.

LEONARD NADLER
Silver Spring, Maryland

I read with interest your article on the Blue Nile. My cousin, Henrie Kadrnka, and I escaped from Yugoslavia in 1952. I came to Canada, and he settled in Switzerland. Having excelled in kayaking, he joined a Swiss expedition in late 1961 to search for the source of the Blue Nile. In January 1962 the expedition was attacked by bandits who shot and killed my cousin and a young doctor. Their bodies were never found and were presumably thrown into the river. That summer I saw a Swiss newspaper article stating that the bandits had been caught, tried, and three of them executed by the Ethiopian military. My cousin's name rests on a headstone in the cemetery in Zagreb, Croatia.

GEORGE KADRKA
Don Mills, Ontario

ZipUSA: North Pole

I am 12 years old, and on November 22 at 9 p.m. I was doing a school project for world geography and stumbled upon your article on North Pole, Alaska. I was pretty upset when I read that kids not much older than me are writing letters back to other kids who have written to Santa Claus. I too got a letter from North Pole last year. Every time I told my friends about the letter, they said, "You're crazy! It was just your parents trying to make you feel good." But I just kept insisting and believing that it was Santa Claus—up until 9 p.m. on November 22. As soon as I read the article, I stopped believing, which is a shame. And for all I know a million other kids who



Photographed by Martin S. Warren

WILDLIFE AS CANON SEES IT

Poised on a meadow wildflower, a dusky large blue butterfly shows its pale underside. The butterfly's intriguing life cycle begins with the female laying her eggs on the flower-heads of the greater burnet plant. Weeks after hatching, the tiny larvae fall to the ground, where foraging red ants pick them up and carry them back to their nest. Tricked by complex chemical signals, the ants adopt the caterpillars for nine months, only to have their own brood eaten by these imposters. The caterpillars can only survive in the nests of one host ant species — *Myrmica rubra*. The dusky large

blue is threatened from drainage of its meadow habitat and changing agricultural practices.

As a global corporation committed to social and environmental concerns, we join in worldwide efforts to promote greater awareness of endangered species for the benefit of future generations.



Dusky Large Blue Butterfly
(*Maculinea nausithous*)

Size: Wingspan, 35 mm

Habitat: Wet meadows with tall grass in southern and central Europe

Surviving number: Population sizes vary from a few individuals to several hundred; the overall number has decreased by more than 50 percent in recent decades



received letters from Santa Claus could have stopped believing then too.

JONATHAN JEFFREY
Hingham, Massachusetts

Shipton's Arch

Why does NATIONAL GEOGRAPHIC condone climbing Shipton's Arch? The author states that the arch is composed of a crumbling rock material. The assault of the rock surfaces undoubtedly did more damage than centuries of weather. The only justification offered by these adventurers was a desire to share a rock climber's emotion with Shipton. That has no value to anyone but them.

LARRY ROSZKOWIAK
Fairfax, California

I had the pleasure of meeting Eric Shipton in the north of England in 1951. He had just unlocked the secret of the southern approach to Everest, the route so popular today. He left a lasting impression on me as a teenager; it is wonderful to have had a hero like Shipton.

J. MICHAEL HARTLEY
Nelson, British Columbia

Polar Bears

One of my most cherished memories as a former submarine officer in the Navy was when we surfaced through the Arctic ice pack in the Beaufort Sea and, to our amazement, were greeted by a mother polar bear and her baby. We took several pictures through the periscope, which unfortunately because of the crosshairs in the view were classified photos. Almost a year later we received permission to declassify the photos. My copy proudly hangs in my study.

KURT GERLACH
San Antonio, Texas

Pictures like the polar bear cub on the cover are part of what makes it worthwhile to continue our global wildlife preservation efforts. That sleeping cub looks so serene, without a care in the world. It makes me want to just kick back and relax. Thank you for reminding us that our animal neighbors can teach us some lessons in living life, which we humans sometimes forget in our daily hustle and bustle.

HENRY CHEN
East Hanover, New Jersey

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DID THE SEA CALL HER BY NAME?



In a time, she understood her time, a time well and common held not mythical. 🌿 There have been incredible lives like yours. The more I thought back, the more I realized how much we owe you. Led over 20 expeditions, logged over 5,000 hours underwater, and built a museum during travels. The most popular lay-out in the U.S. government's decision to declare the budget of the National Marine Sanctuary. 🌿 The United States Marine Biologist, and NOAA and Geographic Explorer. A member of Food Money Movement's Honors for the Planet. A program that's part of ongoing Food System Change mission to understand and support those that make the world a better place. 🌿 The more we know about the Earth and other Honors for the Planet, with our mission, we'll find fascinating information, including links to her books, etc. Around the globe, there are amazing individuals who've dedicated their lives to our planet. We inspire. We model. We realize.

**FOR THE PLANET.**
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EarthPulse

ENVIRONMENT

World of Water—Enough for All?

Unequal distribution, pollution, and competition limit access to fresh water

It evaporates from the oceans, falls on the land, cumulates the rivers, and flows back to the sea—water, a seemingly limitless resource. But only 2.5 percent of Earth's water is fresh water, and most of that is frozen in polar ice and snow. Of the available fresh water, only 0.6 percent is usable. Climate change would reduce where and when water is available, and rising sea levels would turn coastal freshwater brackish.

The hydrologic cycle yields a constant amount of water, but the quality is deteriorating where the human population continues to grow. And 80 million—already 10 percent of the world—more than a billion people do not have safe drinking water, and 1.4 billion die every day from water-related

infectious diseases, many countries strung along a river, for example—real violence may result.

Everyone needs at least 1.8 gallons (6.8 liters) of clean water a day for drinking, cooking, and sanitation, says water specialist Peter H. Gleick. Yet a fifth of the world's people may make do with less than that. Overpopulation and unchecked pollution create scarcity even in Africa and Asia's wet regions.

Some water can be used again. But first, often it must be cleaned first. But most water for irrigation, the highest-use sector, cannot be recycled. In the U.S. about 30 percent of all irrigation water is produced in the Punjab, the High Plains, and the Lower Mississippi. For that it will take



Where is the water going?

Agriculture 70%
About 17 percent of the world's population is producing 40 percent of the food we eat. Using some 700 million acres, we use some 1.2 trillion gallons of water. Rice soaks up huge amounts of water. In the U.S., 1.5 billion gallons of water are used for food that is highly water intensive to

Industry 20%
Technological advances can reduce water use in some industries. In steel-making, a ton of steel uses 1.5 tons of water. In paper-making, a ton of paper uses more than 6 tons of water. In aluminum-making, a ton of aluminum uses 10 tons of water. Water for power plants is

Household 10%
Water is used for drinking and cooking and for drinking in homes and buildings. In some countries, people use 6 gallons of water a day. In the U.S., people use 39 gallons of water a day. In some countries, people use 100 gallons a day.

...and where is the pollution coming from?

Point-source pollution includes sewage and salts from irrigation. Nonpoint-source pollution includes water, and silt from agriculture. Runoff into ground water.

Point-source pollution includes water with chemicals and heavy metals. Nonpoint-source pollution includes emissions create acid rain, which contaminates ground water.

Untreated sewage and industrial effluents pollute water in some countries. Runoff from agriculture and industry pollutes water.



Who has water?

Over 1 billion nations are water-poor in terms of available water per person. In densely populated parts of Africa and Asia, pollution and drought mean that in some countries less than half the population can get safe water. Desalination is a solution for some arid regions, but it's expensive for most.

Annual availability of water resources

- Less than 1,700
- 1,700–5,000
- More than 5,000
- Less than 10% of population has safe water

Who is using the water, and for what?

The U.S., Canada, and Australia—Oceania's biggest consumer—each use more water per capita than most other nations. Except in industrialized Europe and North America, people use most of their water for agriculture.



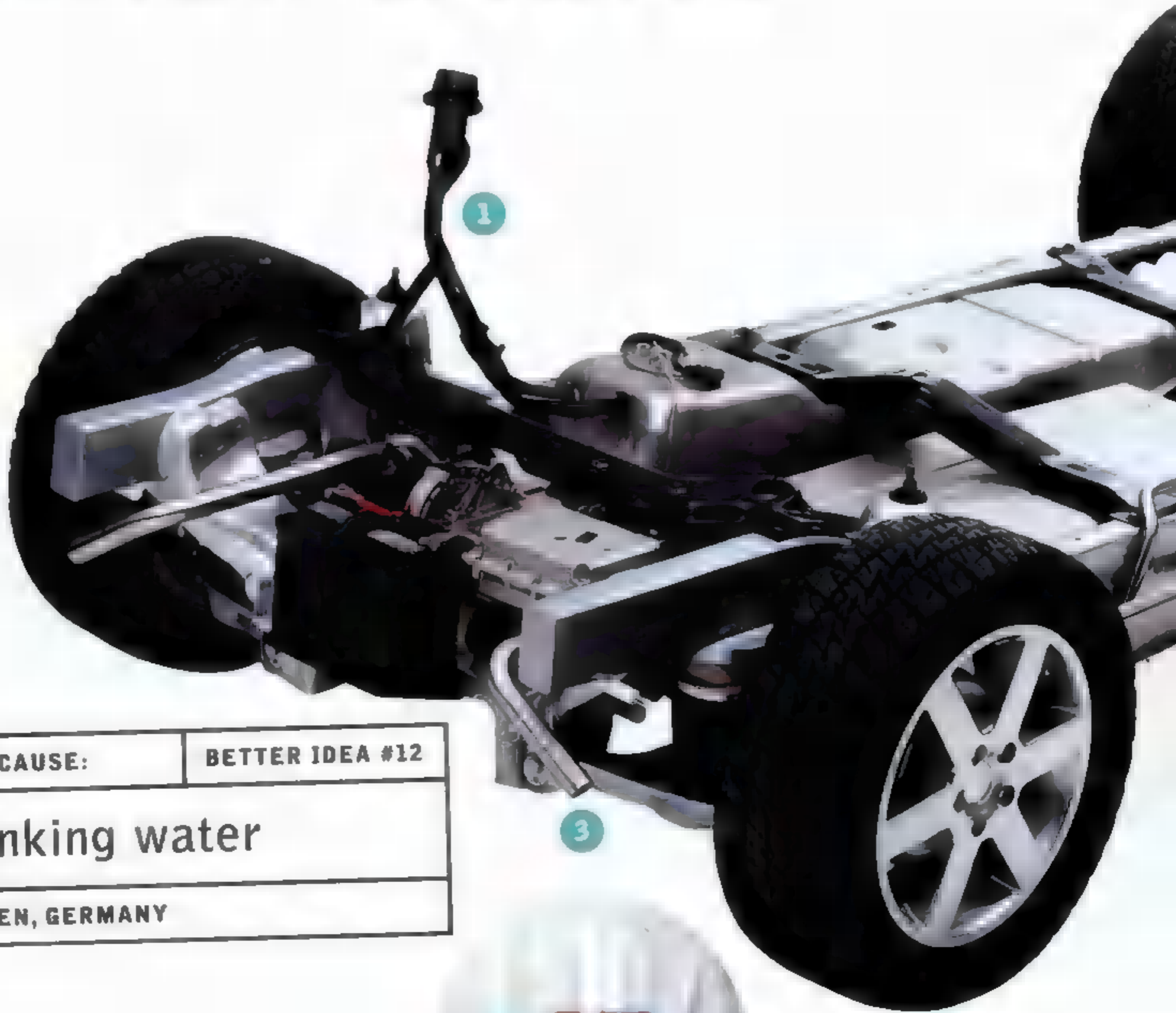
Get Involved

Tour the Columbia River and learn more about the conservation issues facing this majestic river. www.nationalgeographic.com/earthpulse/columbia

The World's Water www.worldwater.org

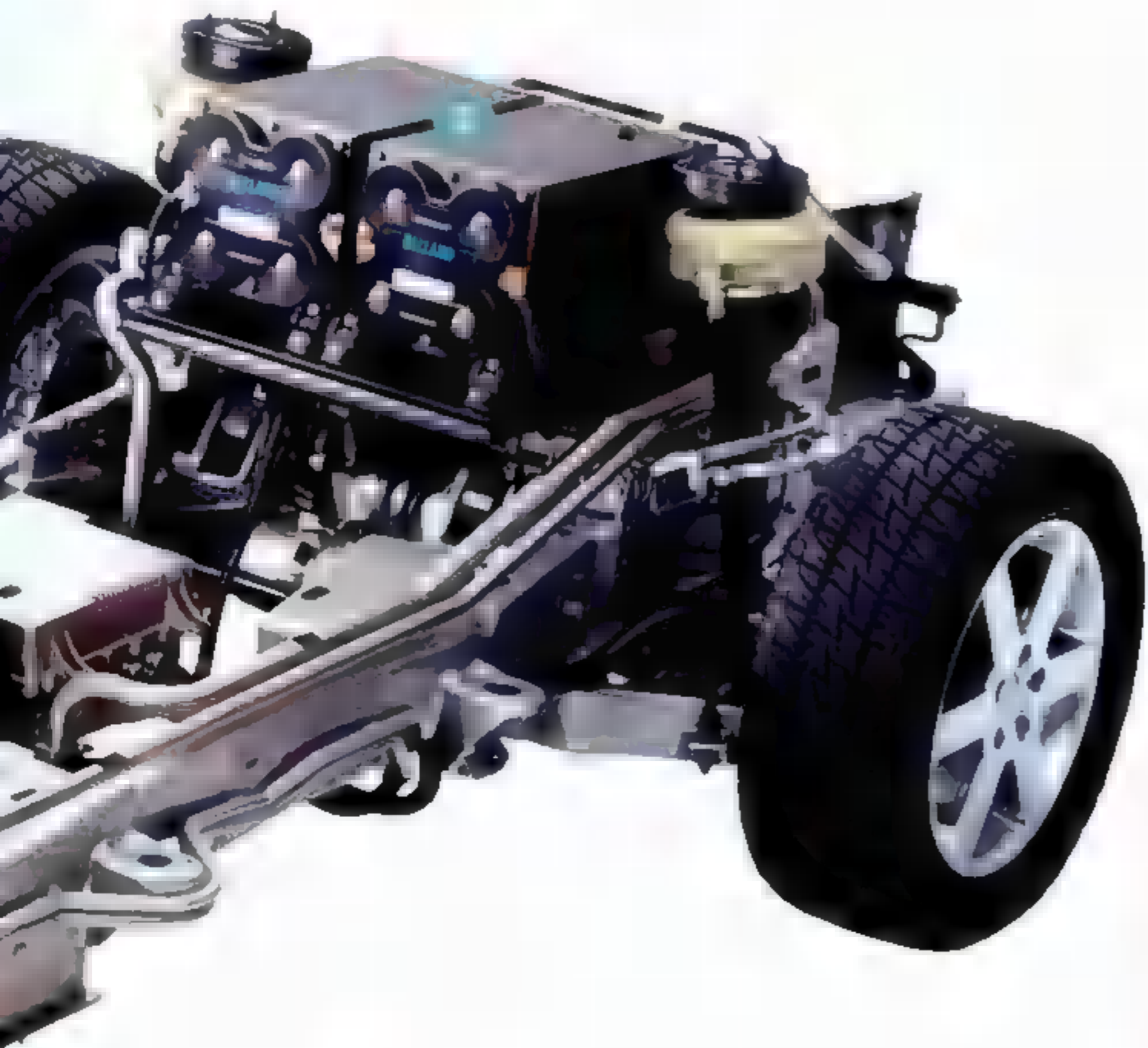
Water Science for Schools www.ga.usgs.gov/edu

Imagine being the has to explain this dinner table.



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dad who one at the



- 1 Hydrogen
(and if there's anything this planet has,
it's hydrogen) goes here.
- 2 Hydrogen connects with oxygen here.

They get to know one another.
Sparks fly.
Motor turns.
Wheels turn.
You get to the grocery store.
- 3 Water, that's right, water, comes out here.



From the fuel cell to the hydrogen fuel cell. By combining hydrogen fuel with oxygen from the air it can produce energy without combustion. Using hydrogen it generates electricity and byproduct is water. No emissions. No smog. No noise. It's not just a different way to believe it is another. We expect to deliver our first fuel cell powered passenger cars to market in California this year.

Mark Sweet, Director/Dave can use the power of Ford's fuel cell technology to power cars still in development. how a hydrogen fuel cell.

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GEOGR

THE PEOPLE, PLACES, AND

■ NGS RESEARCH GRANT

Will Baja Blow Its Top?

The Mexican peninsula's volcanic history—and future

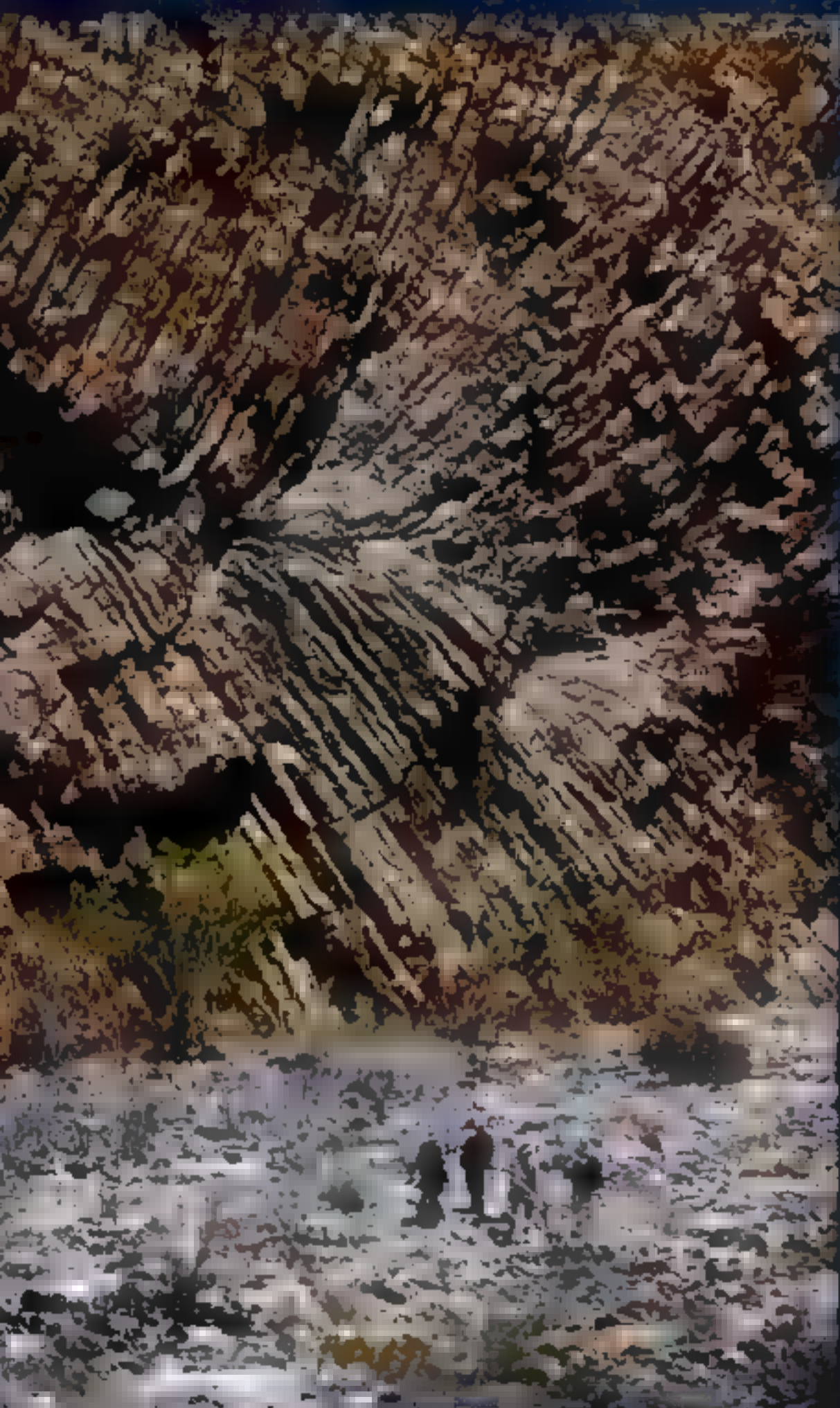


PHOTO BY JAMES SUTTER

They call the crater on Isla San Luis (right) the *El Horno*—the “bell-cup.” And if history grantee Brian Hausback is right, pilots who fly the air corridor over the Gulf of California could someday dodge a mountain’s caps of smoke and ash. “This is a young volcano with an explosive history, and it may erupt again,” says Hausback, whose work in Baja California also includes areas that resemble the La Zorra, another potentially explosive volcano, where a wall of columns flamed last April. Aerial expedition members. “There’s a lot of work to be done yet,” Hausback says of Baja’s volcanoes. “The more we know about the sequence in past eruptions, the better we can predict the next.”

AFRICA

CREATING THE FUTURE OF OUR ENVIRONMENT



CONSERVATION

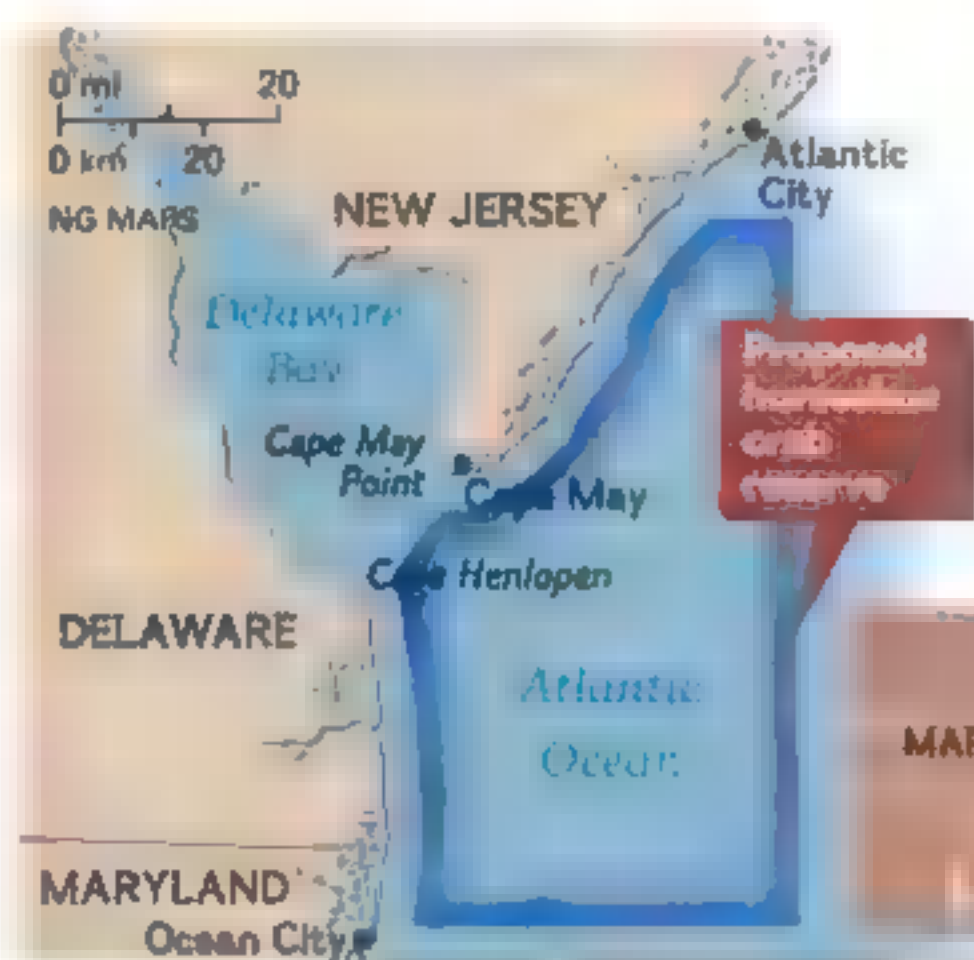
Crab Sanctuary

In a breeding orgy, an army of horseshoe crabs comes ashore around Delaware Bay to spawn in May. Shorebirds flock to gorge on billions of the crabs' eggs, vital protein to fuel the birds on their long migration to the Arctic.

Scientists study the optics and



FRED BAVENDAM, PICTURES



blood of the ancient arthropods—kin to spiders, not crabs.

Commercial harvesting began about ten years ago, when fishermen started selling horseshoe crabs for bait to catch conchs and eels. The conch market is booming in Hong Kong. Along the Atlantic coast 2.75 million

crabs were caught in 1998. The number spawning in Delaware Bay was cut in half.

Now the U.S. Commerce Department is considering regulations that would prohibit harvesting the crabs in 1,500 square nautical miles of the Atlantic at the mouth of Delaware Bay (map). In addition, a 25 percent catch reduction in 15 East Coast states is being enforced by the Atlantic States Marine Fisheries Commission.

“They were strip-mining crabs in Delaware Bay,” says Perry Plumart of the National Audubon Society, which championed the crabs’ cause. “Because of a 90 percent crab-egg loss some shorebirds, like red knots, have declined alarmingly.”

ASTRONOMY

Hot Discovery on the Sun

Magnetic fields provide smoking gun

Why is our sun's outer atmosphere, or corona, 300 times as hot as its surface? NASA's TRACE space craft has hastened an answer by revealing where, but not how, the heat intensifies. Scientists had thought that coronal loops, fountains of hot gas arcing along magnetic field lines (below), were uniformly heated throughout. But TRACE data show that the heat burst occurs near the base.

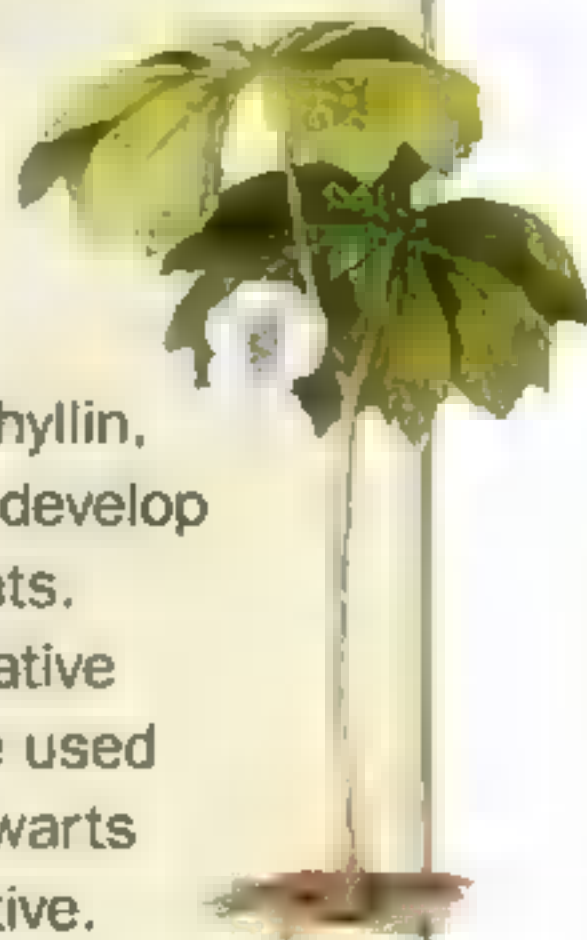


NASA

ALMANAC

April

Leafy umbrellas burst from the forest floor in April ■ mayapples erupt in eastern North America. Flowers and fruits appear in May. The plant's rhizome contains podophyllin, a resin used to develop anticancer agents. For centuries Native Americans have used podophyllin on warts and as a purgative.



ART BY PETER GILBERT

"MEAT NOW."

ALL OF A SUDDEN,

IT'S CLEAR WHAT THEY'RE SAYING.



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taste of meat that makes
of life with cats with an
insatiable appetite for
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NGS RESEARCH GRANT

Unearthing Maya Mysteries

In Belize, an abandoned city comes to light

Deep in the rain forest of northwestern Belize, Norman Hammond found a seat of power—literally (below). The Maya ceremonial throne was just one recent discovery made by the Boston University professor of archaeology, a 23-year Society

grantee. He and associates have spent nine years excavating La Milpa, a Maya city once home to some 50,000 people. Other finds include this urn (right), which may represent a Maya deity. La Milpa's rulers built a palace, temples, and a great plaza larger than two football



fields. The city, which flourished for less than two centuries, was abandoned around A.D. 850.

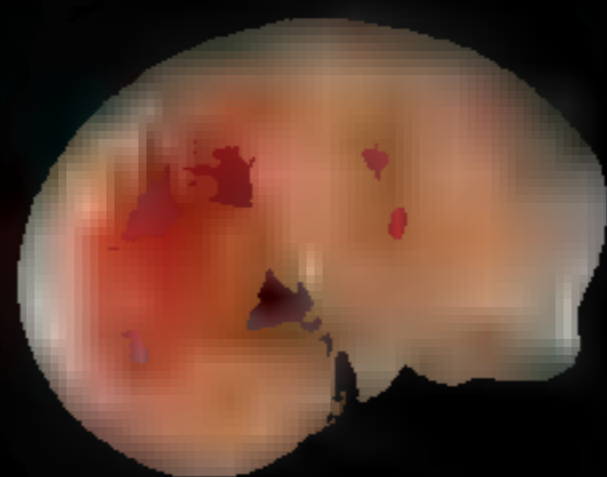


Hammond is also continuing excavations in Belize at Cuello, one of the oldest known Maya sites. Digs last year yielded a turtle-shaped ocarina (above), which may have been used in rituals—or may have been a toy.

NATURE

Marsupials Breathe Through Their Skin

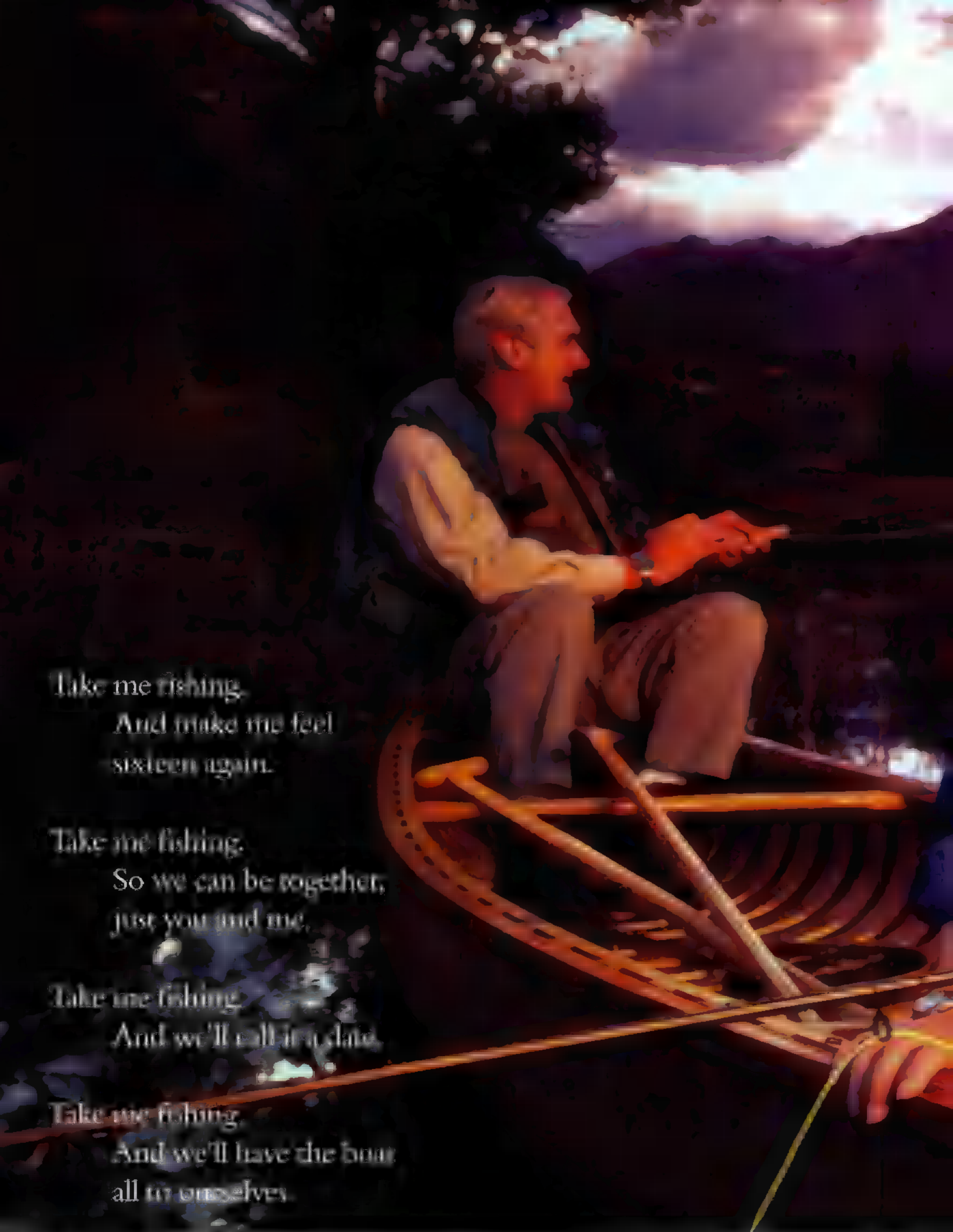
A marsupial mouse in Australia has remarkable survival skills. Named for a Queensland stream, the Julia Creek dunnart weighs just 15 milligrams when born, little bigger than a rice grain (top). Its muscles at birth are not adequate to pump air into its lungs, so for a few weeks it absorbs oxygen through its skin. The dunnart's unusual respiratory system was discovered in 1998



by Canadian physiologist Jacopo Mortola and Australian zoologists Patricia Woolley and Peter Walsh. Now they have found another marsupial, the common wallaby, that does the same, but only for a few days after birth.



JACOPO P. MORTOLA (TOP); P. A. WOOLLEY AND D. WALSH



Take me fishing,
And make me feel
sixteen again.

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So we can be together,
just you and me.

Take me fishing,
And we'll call it a date.

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ENGINEERING

Together Again

Swedes and Danes build a bridge

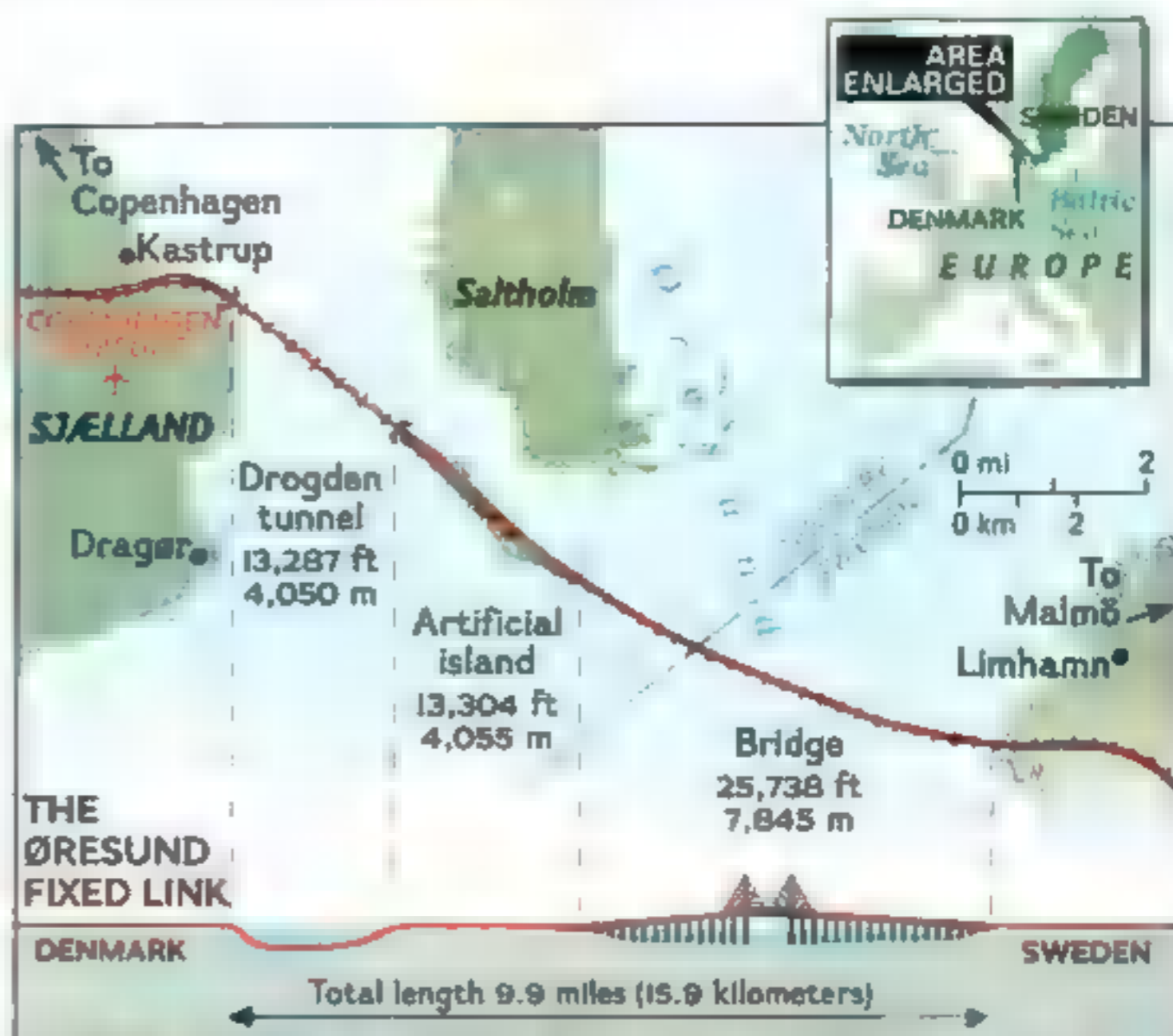
Scandinavia is a little more connected these days. Last summer marked the opening of the Øresund Fixed Link, the first tie between Sweden and Denmark since an ice age sundered the countries about 7,000 years ago.



JAN WINNER

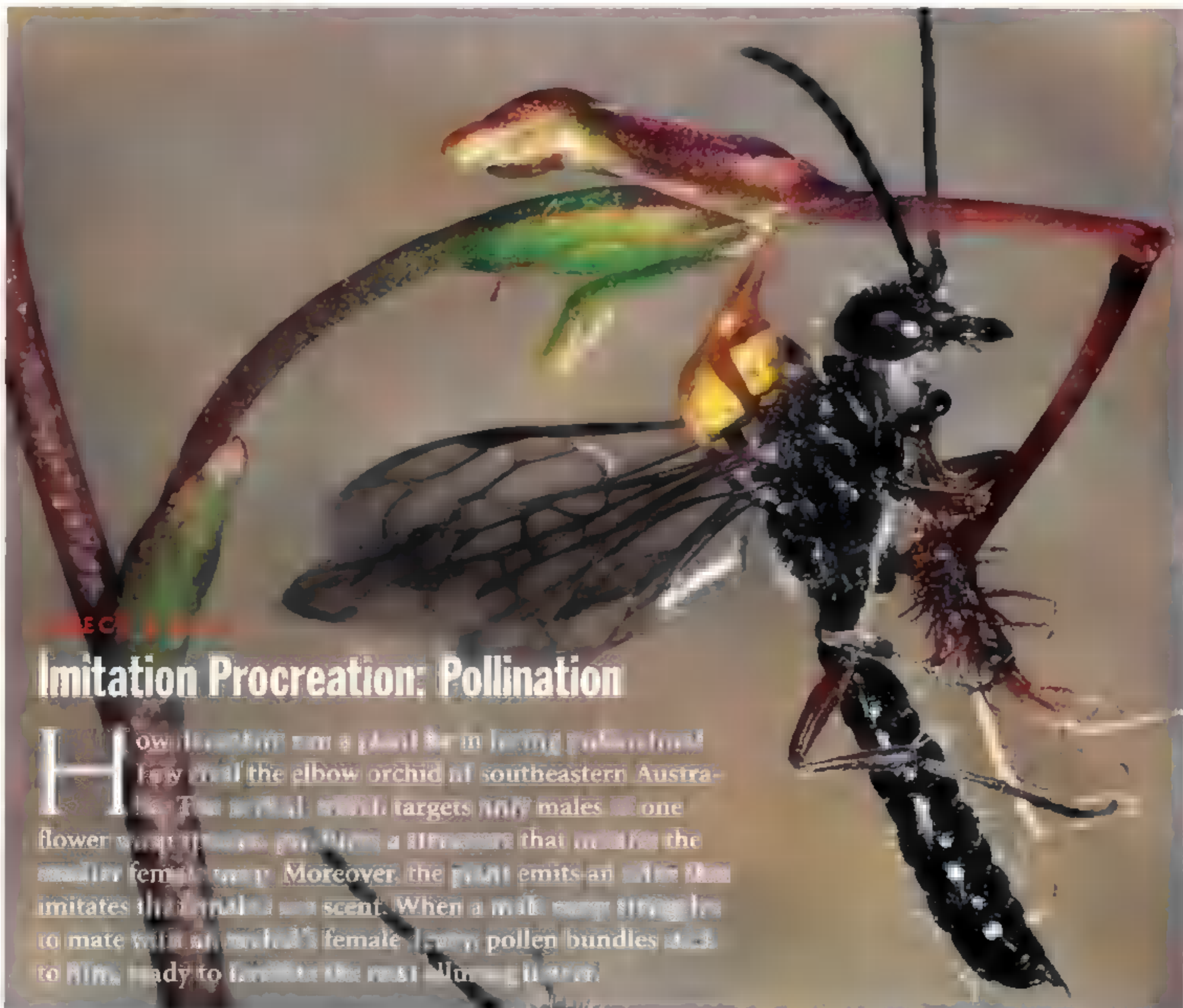
the countries about 7,000 years ago.

A rail system shares the nearly ten-mile route with automobile traffic. As travelers exit Copenhagen via a tunnel, they spill onto a man-made island supporting a stretch of open road and track. Finally, a



BASED ON ART BY SYZYGY MEDIA; DATA BY ØRESUNDSSKONSORTIET; NG MAPS

bridge with four 668-foot-high pylons (left) spans the rest of the Øresund—a shallow sound between the Baltic and North Seas—until it reaches the Swedish coast near Malmö. The project took ten years and 2.1 billion dollars. Some 6,000 vehicles already use it daily for business—and, it turns out, pleasure. Built to encourage commerce, the link has become a tourist attraction itself.



BEHAVIOR

Imitation Procreation: Pollination

How do orchids trick a plant into being pollinated? In the case of the flycatcher orchid of southeastern Australia, the answer is simple: targets only males. One flower wasp that visits the orchid is attracted to the orchid's female fly. Moreover, the plant emits an odor that imitates the female's sex scent. When a male wasp struggles to mate with an orchid's female fly, pollen bundles stick to him, ready to fertilize the next flycatcher.

COLIN BOWER

A man in a military uniform stands in the center, smiling and talking to a man on his left and a young woman on his right. They are in front of a military aircraft. The man on the left is wearing a plaid shirt, and the young woman is wearing a white shirt and a dark tie. The aircraft has "58 FW" visible on its side.

He's not just my son. He's my hero.

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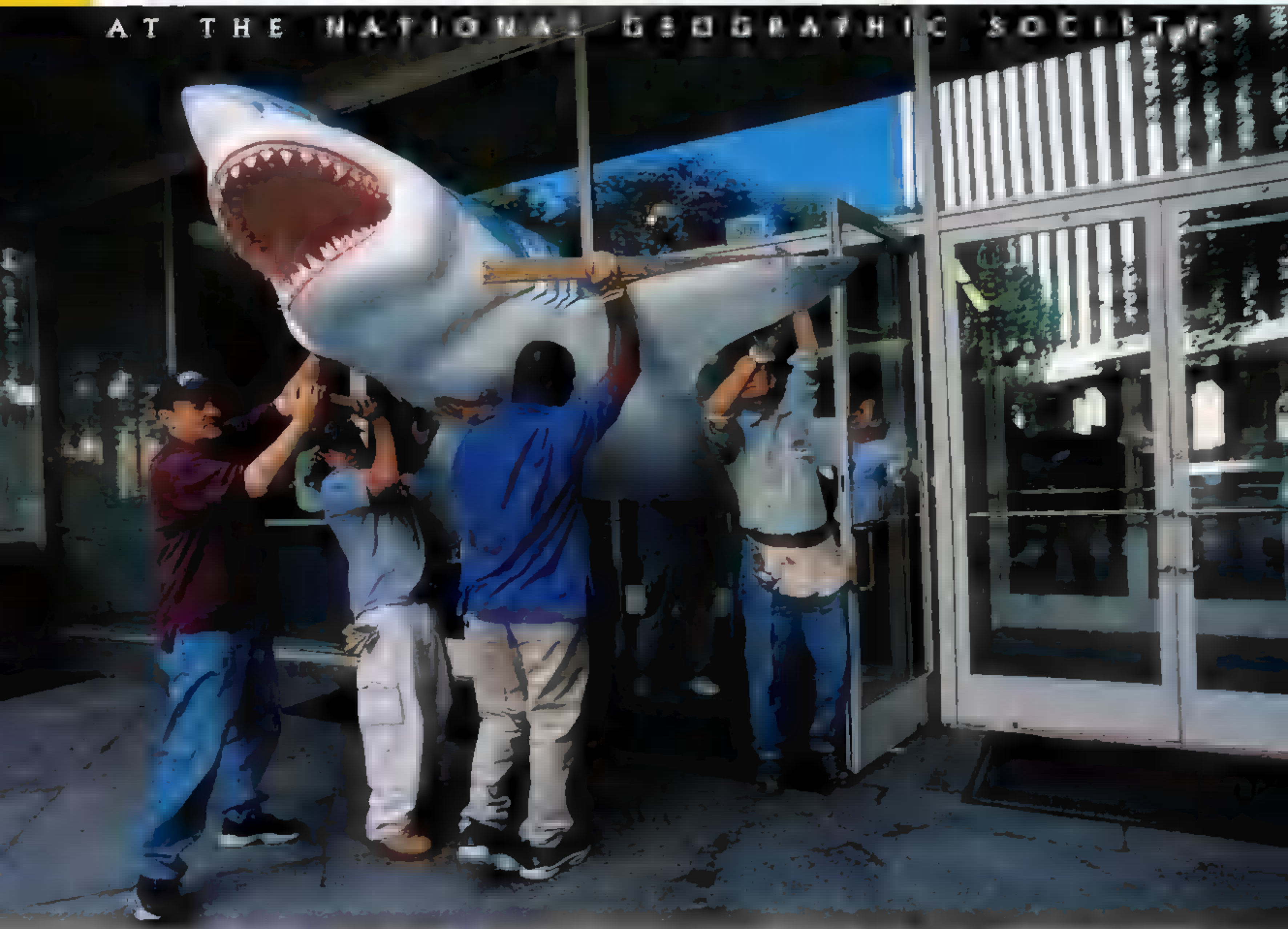
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Join Today's Military

Behind the SCENES

AT THE NATIONAL GEOGRAPHIC SOCIETY



© MAZZATENTA (ABOVE); MARIA STENZEL

One Shark, To Go

Moving day poses a fearsome challenge

How do you move a 16-foot-long, 350-pound model of a great white shark from our Washington, D.C., headquarters to a storage area around the corner?

Ver-r-r-y carefully.

The fiberglass model was the eye-catching centerpiece of last year's exhibit on great whites designed by Richard McWalters, manager of exhibits for our museum, Explorers Hall. When the show closed, Rich and his staff spent three hours just getting it out of the building.

The shark was the latest in a series of offbeat objects the Explorers Hall team has handled. Museum director Susan Norton lists such items as a 500-year-old frozen Inca mummy, a two-ton steel caribou sculpture, a two-story dinosaur cast, a scale model of the international space station, and Ernest Shackleton's 22.5-foot-long lifeboat.

The variety certainly makes for interesting work. Says Daniel Shaffer, technical coordinator, "You don't do stuff like this at most jobs."

EXPLORER-IN-RESIDENCE

Johan Reinhard has spent 22 years roaming the high Andean peaks of South America, looking for clues to ancient cultures. In 1999 he unearthed three frozen mummies in Argentina on the summit of 22,110-foot Cerro Llullallaco, the world's highest archaeological site.



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Meet Mrs. McPhee's new math tutor.

*King cobra eggs have a 70-day incubation period. If 5 king cobras lay their eggs 7 days apart, then 10 days after these eggs hatch, 7 more king cobras lay their eggs 6 days apart, how long until all the eggs have hatched?**

Who would have thought to use statistical data gathered at the zoo to teach complex problem-solving and to foster a greater appreciation of endangered animals?

As far as we know, fifth grade math teacher Paula McPhee of Covington, Washington is the only one. "Zoorithmetics" has earned her State Farm's Good Neighbor Teacher Award™ and a donation of \$10,000 to the educational institution of her choice.



Good Neighbor Teacher Award™

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Home Offices: Bloomington, Illinois

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The Good Neighbor Teacher Award was developed in cooperation with the National Council of Teachers of Mathematics.



*Answer: 214 days.

Driving Passion

Caring for us in Egypt

When Mohamed El Walili (right) retired from the Egyptian Army in 1977 after 24 years—some spent driving future President Hosni Mubarak—he became a tourist taxi driver with an unusual specialty: driving and caring for GEOGRAPHIC staffers. He proudly keeps copies of issues he has worked on in his car.

“Mohamed knows all the places to go, all the people to see, and he doesn’t allow you to go



KENNETH GARRETT

anywhere you could get in trouble,” says photographer Ken Garrett, who has worked with him since 1994. An added benefit:

dinner at the driver’s house. “You sit on the veranda and watch the sound-and-light show at Khufu’s pyramid,” Ken says.

Photographer’s First Century

One of our oldest veterans turns 100

Richard H. Stewart stood outside his darkroom tent in Alaska in 1928 (below), a young photographer on his first field assignment for the GEOGRAPHIC. Dick went on to many more assignments around the world in his 42 years at the Society; perhaps his most memorable photograph captured the

Explorer II balloon (below) poised to lift off on a record-breaking flight into the stratosphere in 1935. “I got it going up, then got it going down,” he says. This month, Dick turns 100—a milestone his wife, Mildred, reached last August. “I’m doing OK for my age,” he allows. “I guess I’ve been pretty lucky.”



BOTH BY RICHARD H. STEWART

100 YEARS AGO



April

“Few appreciate the enormous advances in geographic knowledge during the last one hundred years . . . fully 60 percent of the world’s land area was unexplored in 1800, while scarcely 10 percent now remains unknown.”

—From “Advances in Geographic Knowledge During the Nineteenth Century,” by Brig. Gen. A. W. Greely

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Important Celebrex Information. Celebrex should not be taken in late pregnancy or if you've had aspirin-sensitive asthma or allergic reactions to aspirin or other NSAIDs, sulfonamides, or certain drugs called sulfonamides. In rare cases serious stomach problems, such as bleeding, can occur without warning. The most common side effects in clinical trials were indigestion, dizziness and abdominal pain. Tell your doctor if you have kidney or liver problems. For more information call 1-800-Celebrex or visit www.celbrex.com.

Ask Your Doctor If Celebrex Is Right For You.

CELEBREX

(CELECOXIB CAPSULES) 100mg
200mg

BRIEF SUMMARY—CELEBREX® (celecoxib capsules)

Before prescribing, please consult complete prescribing information.

INDICATIONS AND USAGE

For relief of the signs and symptoms of OA, and of RA in adults.

CONTRAINDICATIONS

CELEBREX is contraindicated in patients with known hypersensitivity to celecoxib. CELEBREX should not be given to patients who have demonstrated allergic-type reactions to sulfonamides. CELEBREX should not be given to patients who have experienced asthma, urticaria, or allergic-type reactions after taking aspirin or other NSAIDs. Severe, rarely fatal, anaphylactoid reactions to NSAIDs have been reported in such patients (see WARNINGS—Anaphylactoid Reactions, and PRECAUTIONS—Preexisting Asthma).

WARNINGS

Gastrointestinal (GI) Effects—Risk of GI Ulceration, Bleeding, and Perforation: Serious GI toxicity such as bleeding, ulceration, and perforation of the stomach, small intestine or large intestine, can occur at any time, with or without warning symptoms, in patients treated with NSAIDs. Minor upper GI problems, such as dyspepsia, are common and may also occur at any time during NSAID therapy. Therefore, physicians and patients should remain alert for ulceration and bleeding, even in the absence of previous GI tract symptoms. Patients should be informed about the signs and/or symptoms of serious GI toxicity and the steps to take if they occur. Only 1/5 patients who develop a serious upper GI adverse event on NSAID therapy is symptomatic. Upper GI ulcers, gross bleeding or perforation, caused by NSAIDs, appear to occur in approximately 1% of patients treated for 3–6 months, and in about 2–4% of patients treated for one year. These trends continue thus, increasing the likelihood of developing a serious GI event at some time during the course of therapy. However, even short-term therapy is not without risk. It is unclear at the present time, how the above rates apply to CELEBREX (see CLINICAL STUDIES—Special Studies in the complete prescribing information). Among 5,285 patients who received CELEBREX in controlled clinical trials of 1 to 6 months duration (most were 3 month studies) at a daily dose of 400 mg or more, 2 (0.04%) experienced significant upper GI bleeding, 14 and 22 days after initiation of dosing. Approximately 40% of these 5,285 patients were in studies that required them to be free of ulcers by endoscopy at study entry. Thus it is unclear if this study population is representative of the general population. Prospective, long-term studies are required to compare the incidence of serious, clinically significant upper GI adverse events in patients taking CELEBREX to comparator NSAID products have not been performed. NSAIDs should be prescribed with extreme caution in patients with a prior history of ulcer disease or GI bleeding. Most spontaneous reports of fatal GI events are in elderly or debilitated patients and therefore special care should be taken in treating this population. To minimize the potential risk for an adverse GI event, the lowest effective dose should be used for the shortest possible duration. For high risk patients, alternate therapies that do not involve NSAIDs should be considered. Studies have shown that patients with a prior history of peptic ulcer disease and/or GI bleeding and who use NSAIDs, have a greater than 10-fold higher risk for developing a GI bleed than patients with neither of these risk factors. In addition to a past history of ulcer disease, pharmacoepidemiological studies have identified several other co-therapies, co-morbid conditions that may increase the risk for GI bleeding such as: treatment with oral corticosteroids, treatment with anticoagulants, longer duration of NSAID therapy, smoking, alcoholism, older age, and poor general health status.

Anaphylactoid Reactions: As with NSAIDs in general, anaphylactoid reactions have occurred in patients without known prior exposure to CELEBREX. In post-marketing experience, rare cases of anaphylactic reactions and angioedema have been reported in patients receiving CELEBREX. CELEBREX should not be given to patients with the aspirin triad. This symptom complex typically occurs in asthmatic patients who experience rhinitis with or without nasal polyps, or who exhibit severe, potentially fatal bronchospasm after taking aspirin or other NSAIDs (see CONTRAINDICATIONS and PRECAUTIONS—Preexisting Asthma). Emergency help should be sought in cases where an anaphylactoid reaction occurs.

Advanced Renal Disease: Treatment with CELEBREX is not recommended.

Pregnancy: In late pregnancy CELEBREX should be avoided because it may cause premature closure of the ductus arteriosus.

PRECAUTIONS

General: CELEBREX cannot be expected to substitute for corticosteroids or to treat corticosteroid insufficiency. The pharmacological activity of CELEBREX in reducing inflammation, and possibly fever, may diminish the utility of these diagnostic signs in detecting infectious complications of presumed noninfectious, painful conditions.

Hepatic Effects: Borderline elevations of one or more liver tests may occur in up to 15% of patients taking NSAIDs, and notable elevations of ALT or AST (approximately three or more times the upper limit of normal) have been reported in approximately 1% of patients in clinical trials with NSAIDs. These laboratory abnormalities may progress, may remain unchanged, may be transient with continuing therapy. Rare cases of severe hepatic reactions, including jaundice and fatal fulminant hepatitis, liver necrosis and hepatic failure (some with fatal outcome) have been reported with NSAIDs, including CELEBREX. (See ADVERSE REACTIONS—post-marketing experience.) In controlled clinical trials of CELEBREX, the incidence of borderline elevations of liver tests was 6% for CELEBREX and 6% for placebo, and approximately 0.2% of patients taking CELEBREX and 0.3% of patients taking placebo had notable elevations of ALT and AST. A patient with symptoms and/or signs suggesting liver dysfunction, or in whom an abnormal liver test has occurred, should be monitored carefully for evidence of the development of a severe hepatic reaction while on therapy with CELEBREX. In clinical signs and symptoms consistent with liver disease develop, or if systemic manifestations occur (e.g., eosinophilia, rash, etc.), CELEBREX should be discontinued.

Renal Effects: Long-term administration of NSAIDs has resulted in renal papillary necrosis and other renal injury. Renal toxicity has also been seen in patients in whom renal prostaglandins have a compensatory role in the maintenance of renal perfusion. In these patients, administration of an NSAID may cause a dose-dependent reduction in prostaglandin formation and, secondarily, in renal blood flow, which may precipitate overt renal decompensation. Patients at greatest risk of this reaction are those with impaired renal function, heart failure, liver dysfunction, those taking diuretics and ACE inhibitors, and the elderly. Discontinuation of NSAID therapy is usually followed by recovery to the pretreatment level. Clinical trials with CELEBREX have shown renal effects similar to those observed with comparator NSAIDs. Caution should be used when initiating treatment with CELEBREX in patients with considerable dehydration. It is advisable to rehydrate patients first and then start therapy with CELEBREX. Caution is also recommended in patients with pre-existing kidney disease (see WARNINGS—Advanced Renal Disease).

Hematological Effects: Anemia may occur. In controlled clinical trials the incidence of anemia was 0.6% with CELEBREX and 0.4% with placebo. Patients on long-term treatment with CELEBREX should have their hemoglobin or hematocrit checked if they exhibit any signs or symptoms of anemia or blood loss. CELEBREX does not generally affect platelet counts, prothrombin time (PT), or partial thromboplastin time (PTT), and does not appear to inhibit platelet aggregation at indicated dosages (See CLINICAL STUDIES—Special Studies—Platelets in the complete prescribing information).

Fluid Retention and Edema: Fluid retention and edema may occur (see ADVERSE REACTIONS). Therefore, CELEBREX should be used with caution in patients with fluid retention, hypertension, or heart failure.

Preexisting Asthma: Do not use in patients with aspirin-sensitive asthma because of the risk of severe bronchospasm. Use with caution in patients with preexisting asthma.

Laboratory Tests: Because serious GI tract ulcerations and bleeding can occur without warning symptoms, physicians should monitor for signs or symptoms of GI bleeding. During the controlled clinical trials, there was an increased incidence of hypercholesterolemia in patients receiving celecoxib compared with patients on placebo. Other laboratory abnormalities that occurred more frequently in the patients receiving celecoxib included hypophosphatemia, and elevated BUN. These laboratory abnormalities were also seen in patients who received comparator NSAIDs in these studies. The clinical significance of these abnormalities has not been established.

Drug Interactions: **General:** Celecoxib metabolism is predominantly via cytochrome P450 2C9 in the liver. Co-administration of celecoxib with drugs that are known to inhibit 2C9 should be done with caution. *In vitro* studies indicate that celecoxib, although not a substrate, is an inhibitor of cytochrome P450 2D6. Therefore, there is a potential for an *in vivo* drug interaction with drugs that are metabolized by P450 2D6. **ACE-inhibitors:** Reports suggest that NSAIDs may diminish the antihypertensive effect of Angiotensin Converting Enzyme (ACE) inhibitors. This interaction should be given consideration in patients taking CELEBREX concomitantly with ACE-inhibitors. **Furosemide:** Clinical studies, as well as post marketing observations, have shown that NSAIDs can reduce the natriuretic effect of furosemide and thiazides in some patients. This response has been attributed to inhibition of renal prostaglandin synthesis. **Aspirin:** CELEBREX should be used with low dose aspirin. However, concomitant administration of aspirin with CELEBREX may result in an increased rate of GI ulceration or other complications, compared to use of CELEBREX alone (see CLINICAL STUDIES—Special Studies—Gastrointestinal in the complete prescribing information). Because of the lack of platelet effects, CELEBREX is not a substitute for aspirin for cardiovascular prophylaxis. **Fluconazole:** Concomitant administration of fluconazole at 200 mg QD resulted in a two-fold increase in celecoxib plasma concentration. This increase is due to the inhibition of celecoxib metabolism via P450 2C9 by fluconazole (see Pharmacokinetics—Metabolism). CELEBREX should be introduced at the lowest recommended dose in patients receiving fluconazole. **Lithium:** In a study conducted in healthy

subjects, mean steady-state lithium plasma levels increased approximately 17% in subjects receiving lithium 300 mg BID with CELEBREX 400 mg BID as compared to subjects receiving lithium alone. Patients on lithium treatment should be closely monitored when CELEBREX is introduced or withdrawn. **Methotrexate:** In an interaction study of rheumatoid arthritis patients taking methotrexate, CELEBREX did not have a significant effect on the pharmacokinetics of methotrexate. **Warfarin:** Anticoagulant activity should be monitored, particularly in the first few days, after initiating or changing CELEBREX therapy in patients receiving warfarin or similar agents, since these patients are at an increased risk of bleeding complications. The effect of celecoxib on the anticoagulant effect of warfarin was studied in a group of healthy subjects receiving daily doses of 2–5 mg of warfarin. In these subjects, celecoxib did not alter the anticoagulant effect of warfarin as determined by prothrombin time. However, in post-marketing experience, bleeding events have been reported, predominantly in the elderly, in association with increases in prothrombin time in patients receiving CELEBREX concurrently with warfarin. **Carcinogenesis, mutagenesis, impairment of fertility:** Celecoxib was not carcinogenic in rats given oral doses up to 200 mg/kg for males and 100 mg/kg for females (approximately 2- to 4-fold the human exposure as measured by the AUC_{0–24} at 200 mg BID) or in mice given oral doses up to 25 mg/kg for males and 50 mg/kg for females (approximately equal to human exposure as measured by the AUC_{0–24} at 200 mg BID) for two years. Celecoxib was not mutagenic in an Ames test and a mutation assay in Chinese hamster ovary (CHO) cells, nor clastogenic in a chromosome aberration assay in CHO cells and an *in vivo* micronucleus test in rat bone marrow. Celecoxib did not impair male and female fertility in rats at oral doses up to 600 mg/kg/day (approximately 11-fold human exposure at 200 mg BID based on the AUC_{0–24}).

Pregnancy: Teratogenic effects: Pregnancy Category C. Celecoxib was not teratogenic in rabbits up to an oral dose of 60 mg/kg/day (equal to human exposure at 200 mg BID as measured by AUC_{0–24}); however, at oral doses ≥ 100 mg/kg/day (approximately 2-fold human exposure at 200 mg BID as measured by AUC_{0–24}), an increased incidence of fetal alterations, such as ribs fused, sternbrae fused and sternbrae misshapen, was observed. A dose-dependent increase in diaphragmatic hernias was observed in one of two rat studies at oral doses ≥ 30 mg/kg/day (approximately 6-fold human exposure based on the AUC_{0–24} at 200 mg BID). There are no studies in pregnant women. CELEBREX should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nonteratogenic effects:** Celecoxib produced preimplantation and post-implantation losses and reduced embryo/fetal survival in rats at oral dosages ≥ 50 mg/kg/day (approximately 6-fold human exposure based on the AUC_{0–24} at 200 mg BID). These changes were expected with inhibition of prostaglandin synthesis and are not the result of perinatal alteration of female reproductive function, nor are they expected at clinical exposures. No studies have been conducted to evaluate the effect of celecoxib on the closure of the ductus arteriosus in humans. Therefore, use of CELEBREX during the third trimester of pregnancy should be avoided. **Labor and delivery:** Celecoxib produced no evidence of delayed labor or parturition at oral doses up to 100 mg/kg in rats (approximately 7-fold human exposure as measured by the AUC_{0–24} at 200 mg BID). The effects of CELEBREX on labor and delivery in pregnant women are unknown. **Nursing mothers:** It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk and because of the potential for serious adverse reactions in nursing infants from CELEBREX, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. **Pediatric Use:** Safety and effectiveness in pediatric patients below the age of 18 years have not been evaluated.

Geriatric Use: Of the total number of patients who received CELEBREX in clinical trials, more than 2,100 were 65–74 years of age, while approximately 800 additional patients were 75 years and over. While the incidence of adverse experiences tended to be higher in elderly patients, no substantial differences in safety or effectiveness were observed between these subjects and younger subjects. Other reported clinical experience has not identified differences in response between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out. In clinical studies comparing renal function measured by the GFR, BUN and creatinine, and platelet function as measured by bleeding time and platelet aggregation, the results were not different between elderly and young volunteers.

ADVERSE REACTIONS

Adverse events occurring in ≥ 2% of Celebrex patients from controlled arthritis trials, regardless of causality at recommended doses (N=4146): abdominal pain 4.1%, diarrhea 5.8%, dyspepsia 2.2%, flatulence 2.2%, nausea 3.5%, back pain 2.8%, peripheral edema 2.1%, injury-accidental 2.9%, dizziness 2.0%, headache 15.8%, insomnia 2.3%, pharyngitis 2.3%, rhinitis 2.0%, sinusitis 5.0%, upper respiratory tract infection 8.1%, rash 2.2%. In placebo- and active-controlled clinical trials, the discontinuation rate due to adverse events was 7.1% for patients receiving CELEBREX and 6.1% for patients receiving placebo. Among the most common reasons for discontinuation due to adverse events in the CELEBREX treatment groups were dyspepsia and abdominal pain (cited as reasons for discontinuation in 0.8% and 0.7% of CELEBREX patients, respectively). Among patients receiving placebo, 0.6% discontinued due to dyspepsia and 0.6% withdrew due to abdominal pain. The following adverse events occurred in 0.1–1.9% of patients regardless of causality.

100–200 mg BID or 200 mg QD: GI: Constipation, diverticulitis, dysphagia, eructation, esophagitis, gastritis, gastroenteritis, gastroesophageal reflux, hemorrhoids, hiatal hernia, melena, dry mouth, stomatitis, tenesmus, tooth disorder, vomiting; **Cardiovascular:** Aggravated hypertension, angina pectoris, coronary artery disorder, myocardial infarction; **General:** Allergy aggravated, allergic reaction, asthenia, chest pain, cyst NOS, edema generalized, face edema, fatigue, fever, hot flushes, influenza-like symptoms, pain, peripheral pain; **Resistance mechanism disorders:** Herpes simplex, herpes zoster, infection bacterial, infection fungal, infection soft tissue, infection viral, moniliasis, moniliasis genital, otitis media; **Central, peripheral nervous system:** Leg cramps, hypertonia, hypoesthesia, migraine, neuralgia, neuropathy, paresthesia, vertigo; **Female reproductive:** Breast fibroadenosis, breast neoplasm, breast pain, dysmenorrhea, menstrual disorder, vaginal hemorrhage, vaginitis; **reproductive:** Prostatic disorder; **Hearing and vestibular:** Deafness, ear abnormality, earache, tinnitus; **Heart rate and rhythm:** Palpitation, tachycardia; **Liver and biliary system:** Hepatic function abnormal, SGOT increased, SGPT increased; **Metabolic and nutritional:** BUN increased, CPK increased, diabetes mellitus, hypercholesterolemia, hyperglycemia, hypokalemia, NPN increase, creatinine increased, alkaline phosphatase increased, weight increase; **Musculoskeletal:** Arthralgia, arthrosis, bone disorder, fracture accidental, myalgia, neck stiffness, synovitis, tendinitis; **Platelets (bleeding or clotting):** Echinosis, epistaxis, thrombocytopenia; **Psychiatric:** Anorexia, anxiety, appetite increased, depression, nervousness, somnolence; **Hemic:** Anemia; **Respiratory:** Bronchitis, bronchospasm, bronchospasm aggravated, coughing, dyspnea, laryngitis, pneumonia; **Skin and appendages:** Alopecia, dermatitis, nail disorder, photosensitivity reaction, pruritus, rash erythematous, rash maculopapular, skin disorder, skin dry, sweating increased, urticaria; **Application site disorders:** Cellulitis, dermatitis contact, injection site reaction, skin nodule; **Special senses:** Taste perversion; **Urinary system:** Albuminuria, cystitis, dysuria, hematuria, micturition frequency, renal calculus, urinary incontinence, urinary tract infection; **Vision:** Blurred vision, cataract, conjunctivitis, eye pain, glaucoma.

Other serious adverse reactions which occur rarely (estimated < 0.1%), regardless of causality: The following adverse events have occurred rarely in patients taking CELEBREX. Cases reported only in the post-marketing experience are indicated in italics. **Cardiovascular:** Syncope, congestive heart failure, ventricular fibrillation, pulmonary embolism, cerebrovascular accident, peripheral gangrene, thrombophlebitis, vasculitis. **GI:** intestinal obstruction, intestinal perforation, gastrointestinal bleeding, colitis with bleeding, esophageal perforation, pancreatitis, ileus; **Liver and biliary system:** Cholelithiasis, hepatitis, jaundice, liver failure; **Hemic and lymphatic:** Thrombocytopenia, agranulocytosis, aplastic anemia, pancytopenia, leukopenia; **Metabolic:** Hypoglycemia; **Nervous system:** Ataxia, suicide; **Renal:** Acute renal failure, interstitial nephritis; **Skin:** Erythema multiforme, exfoliative dermatitis, Stevens-Johnson syndrome, toxic epidermal necrolysis; **General:** Sepsis, sudden death, anaphylactoid reaction, angioedema.

Symptoms following acute NSAID overdoses are usually limited to lethargy, drowsiness, nausea, vomiting, and epigastric pain, which are generally reversible with supportive care. GI bleeding can occur. Hypertension, acute renal failure, respiratory depression and coma may occur, but are rare. Anaphylactoid reactions have been reported with therapeutic ingestion of NSAIDs, and may occur following an overdose. Patients should be managed by symptomatic and supportive care following an NSAID overdose. There are no specific antidotes. No information is available regarding the removal of celecoxib by hemodialysis, but based on its high degree of plasma protein binding (> 97%) dialysis is unlikely to be useful in overdose. Emesis and/or activated charcoal (60 to 100 g in adults, 8 to 2 g/kg in children) and/or osmotic cathartic may be indicated in patients seen within 4 hours of ingestion with symptoms or following a large overdose. Forced diuresis, alkalization of urine, hemodialysis, hemoperfusion may not be useful due to high protein binding.

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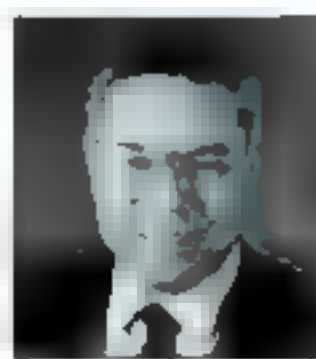
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LAURI HAFVENSTEIN

Trek in Nepal

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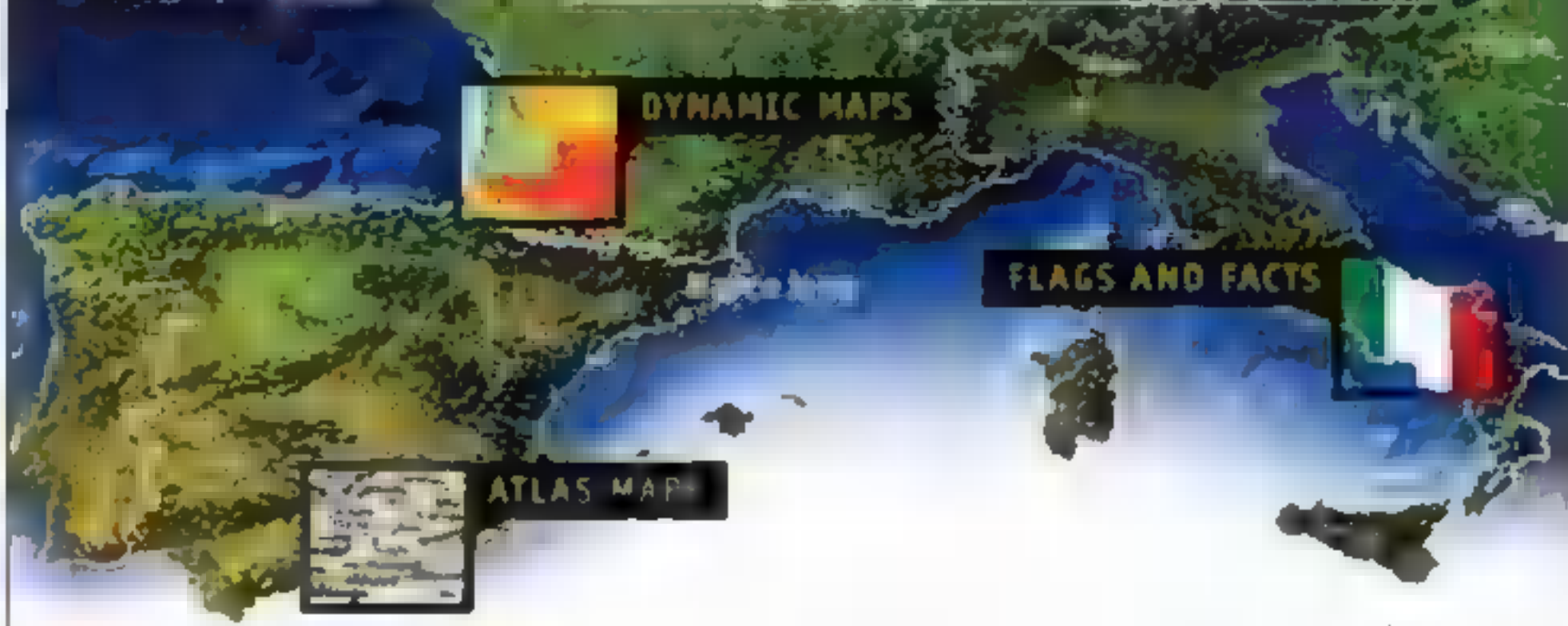
A wet, frigid pageant of life plays out as remote video cameras look in on the daily activities of Steller sea lions on Alaska's rocky Chiswell Island. Watch as these massive creatures fight, mate, feed, rest, and "roll walk" on their flippers. See the Steller sea lions and other animals at nationalgeographic.com/livecam.



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Portraits of Survival

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SUSAN MIDDLETON ■■■ DAVID LIITTSCHWAGER

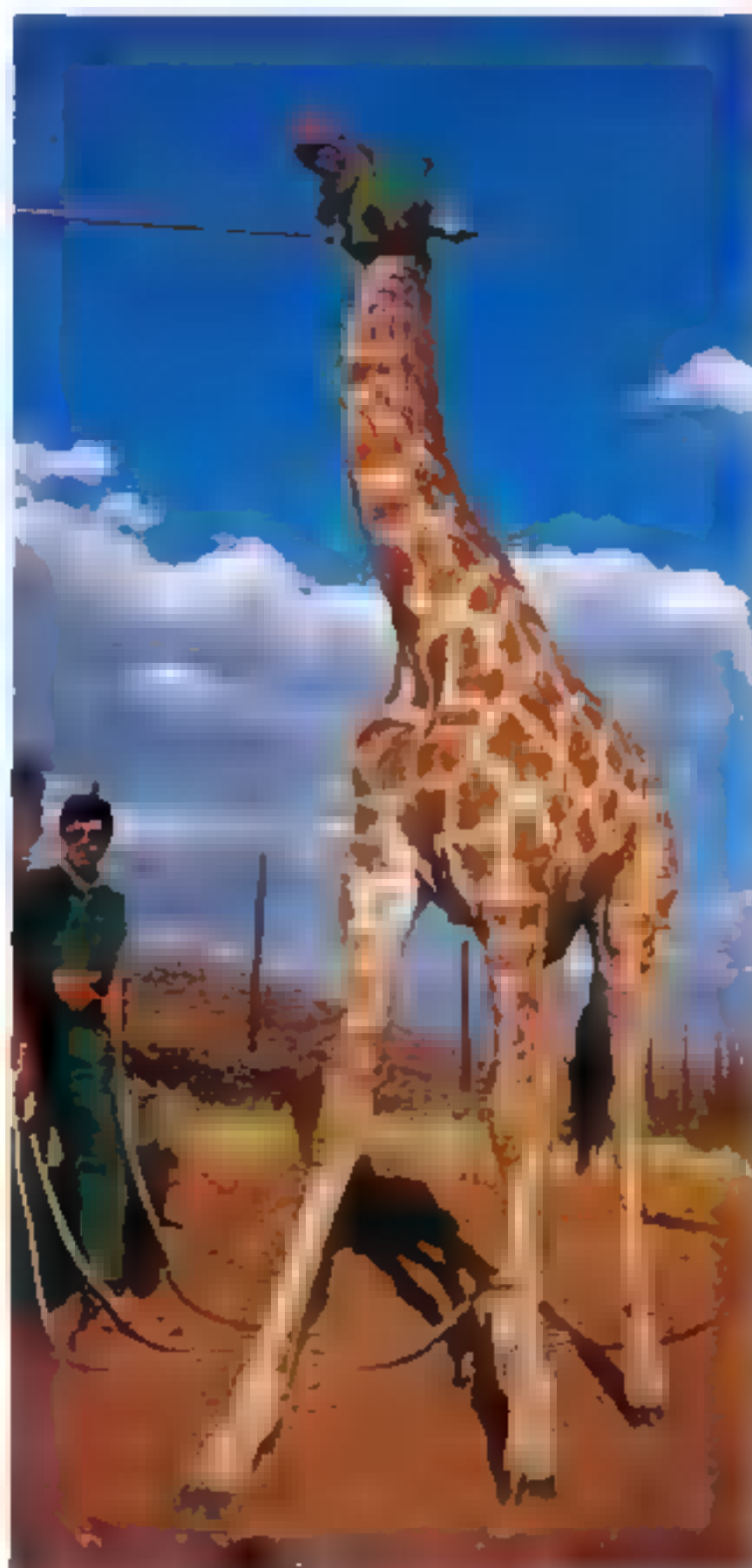


GEORGE F. MOBLEY

NATIONAL GEOGRAPHIC CHANNEL, APRIL 22

Kings of Alaska

Salmon-eating brown bears share Alaska's Kodiak Island with native Alutiiq people. *Island of the Giant Bears*, part of the Earth Day marathon, explores how man and animal get along.



DAVID REDDICK

NATIONAL GEOGRAPHIC EXPLORER, CNBC

Back to Nature

Hooded to calm it and keep it from kicking, a giraffe is coaxed toward the trailers that will relocate it from an overcrowded game farm to the wilderness of Namibia's Fish River Canyon. *Wild Vet: Tall Challenge*, airing this month, presents the continuing adventures of veterinarian Ulf Tubbesing as he and conservationist Natacha Batault restore an African ecosystem with new populations of wild animals. The giraffe will run free with more than 700 other animals relocated in the past two years.

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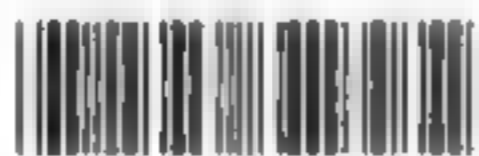
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Ask Us

THE ANSWER PLACE

Our Research Correspondence staff responds to questions from curious readers.

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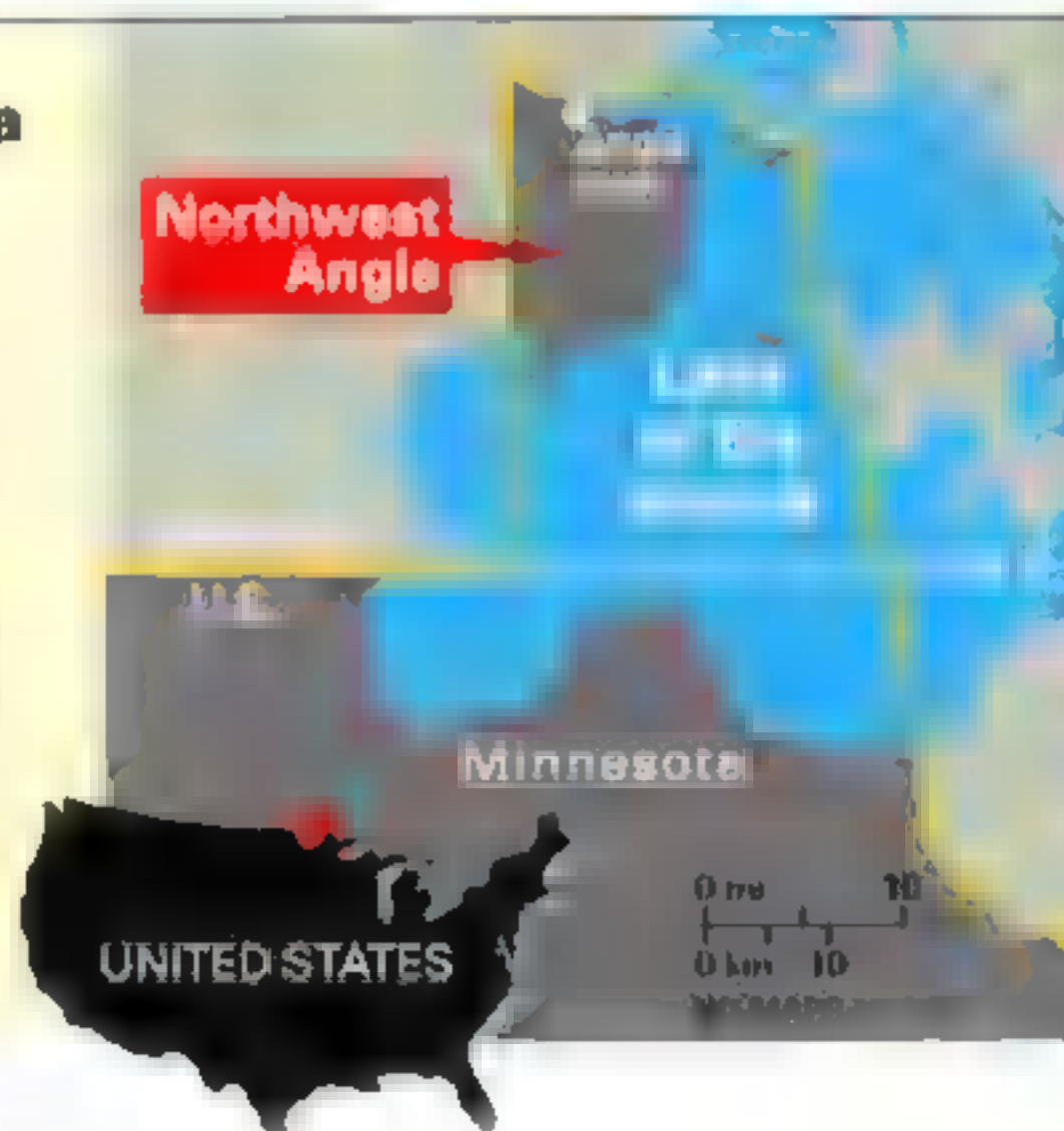
A Yes. Although China's east-west span would otherwise straddle five time zones, all China's 1.26 billion residents are on Beijing time. The country's eastern and western extremes are at least two hours out of sync with the nations at their borders. In the remote Pamir mountains, a noontime hop across the border into Afghanistan transports a person back to 8:30 a.m.

Q Do eagles really assist their young in flight training?

A Some offer a lift. Golden eagles, for example, have been known to swoop under their flapping eaglets and fly upward with the eaglets on their backs

Q Why is part of Minnesota separated from the U.S.?

A Using a map that mislocated the source of the Mississippi River, treaty makers in 1783 drew the U.S. boundary too far north. Later it was dropped to the 49th parallel at the edge of Lake of the Woods, creating the Northwest Angle.



before dumping them off and repeating the process.

Q What was the first city in the world to reach a population of one million?

A Rome holds the honor, with one million residents by A.D. 1.

Q What is the genesis of the 42-gallon barrel of petroleum?

A In 1866 oil producers in western Pennsylvania, center of the emerging industry, agreed to sell their product by the gallon instead of random-size

barrels. They decreed that "an allowance of two gallons will be made on the gauge of each and every 40 gallons in favor of the buyer." The Petroleum Producers Association adopted the 42-gallon barrel in 1872.

MORE INFORMATION

Send questions to Ask Us, National Geographic Magazine, PO Box 96095, Washington, DC 20090-6095 or via the Internet to ngsaskus@nationalgeographic.com. Include name, address, and daytime phone number.

TELL US

What creature's "birthday" package comes wrapped in these lengths of scarlet ribbon? Hint: This animal can be a little sluggish.

Think you know the answer? Go online to nationalgeographic.com/ngm/tellus/0104 and test yourself, or read it here in this month's issue.

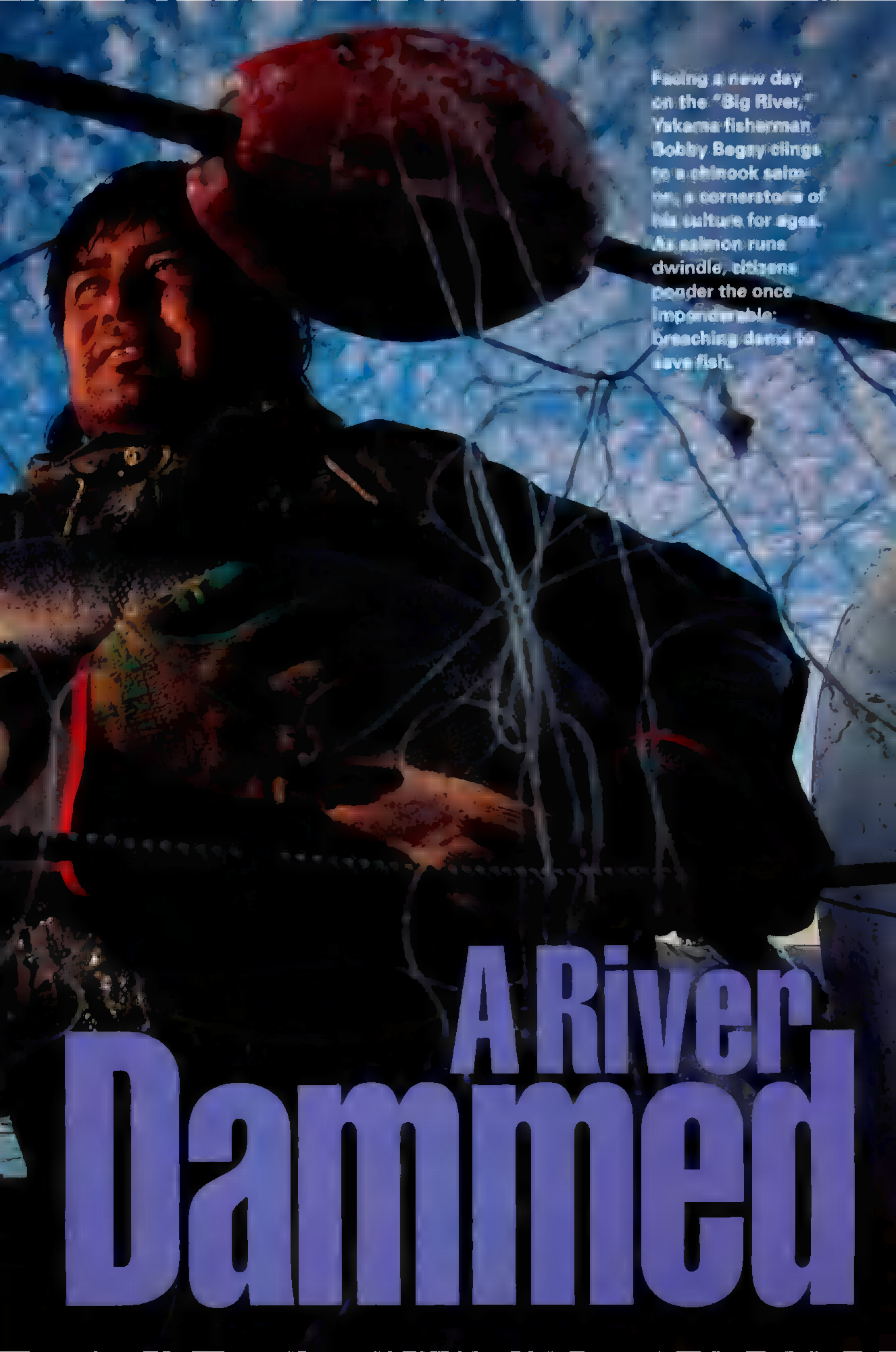
March Answer On Sundays and holidays more than 100,000 lightbulbs brighten the night sky outside the Mysore Palace in Mysore, Karnataka state.



JIM LAMAN



**Tamed for power,
stripped of salmon:
What next for the
Columbia River?**

A man in a dark jacket is holding a large salmon on a wooden pole. The background is a clear blue sky. The man is looking towards the camera with a serious expression. The salmon is large and has a reddish-pink hue. The wooden pole is dark and appears to be part of a fishing rig or a structure. The overall scene is outdoors and brightly lit.

Facing a new day
on the "Big River,"
Yakama fisherman
Bobby Begay clings
to a chinook salmon,
a cornerstone of
his culture for ages.
As salmon runs
dwindle, citizens
ponder the once
imponderable:
breaching dams to
save fish.

A River Dammed

Dams

**Grand Coulee
Irrigates
640,000 acres
and produces
enough electricity
for a million
households.**

**Grand Coulee
is a salmon
exterminator,
eliminating
a thousand miles
of habitat on the
Columbia and
its tributaries.**

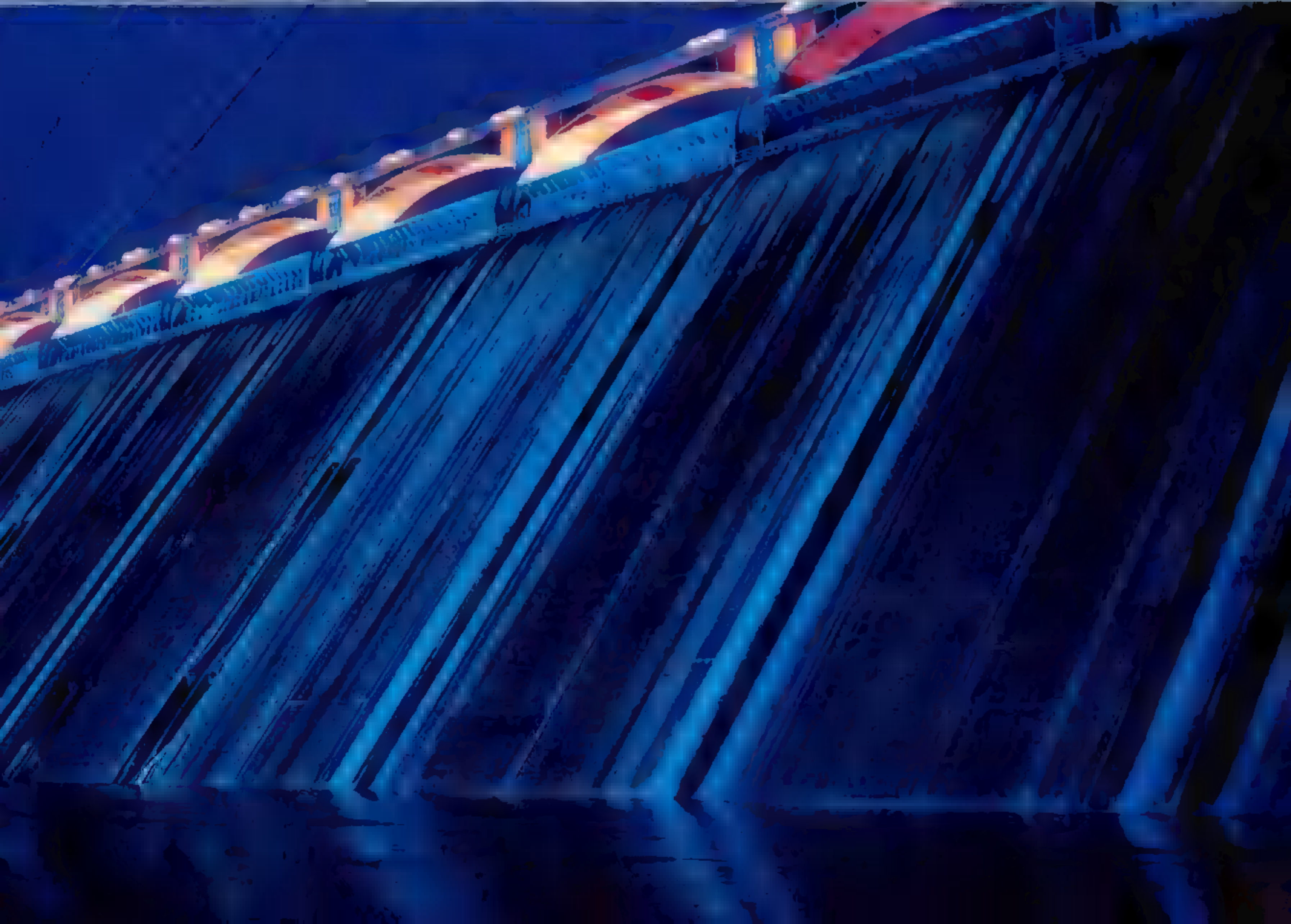
Sparks fly at Grand Coulee Dam during routine tests to the blades of 700 megawatt turbines that could easily power the city of Portland. The dam's 27 generators are the most efficient in the world, and are twice as efficient as any other dam on the continent.





"I am the river...
I am life." booms
the laser light show
that plays on Grand
Coulee Dam each
summer night.
Spillway mimics
snowmelt (above)
near the head-
waters in the Cana-
dian Rockies. Too
tall for fish ladders,
the dam wiped out
"June hogs" the
largest salmon.





Jobs

Breaching Snake River dams could cost nearly 3,000 long-term jobs, by Army Corps of Engineers estimates.

The Corps also says breaching could create some 2,300 new long-term jobs and employ more than 20,000 people in the short term.

Leader of a pro-dam coalition, farmer Tom Flint makes his point to drivers on I-90 near Moses Lake, Washington. Flint, who irrigates 900 acres, says dams "made this country great."



SAVE OUR DAMS



By Fen Montaigne

Photographs by Jim Richardson

T

he tugboat *Mary B*,

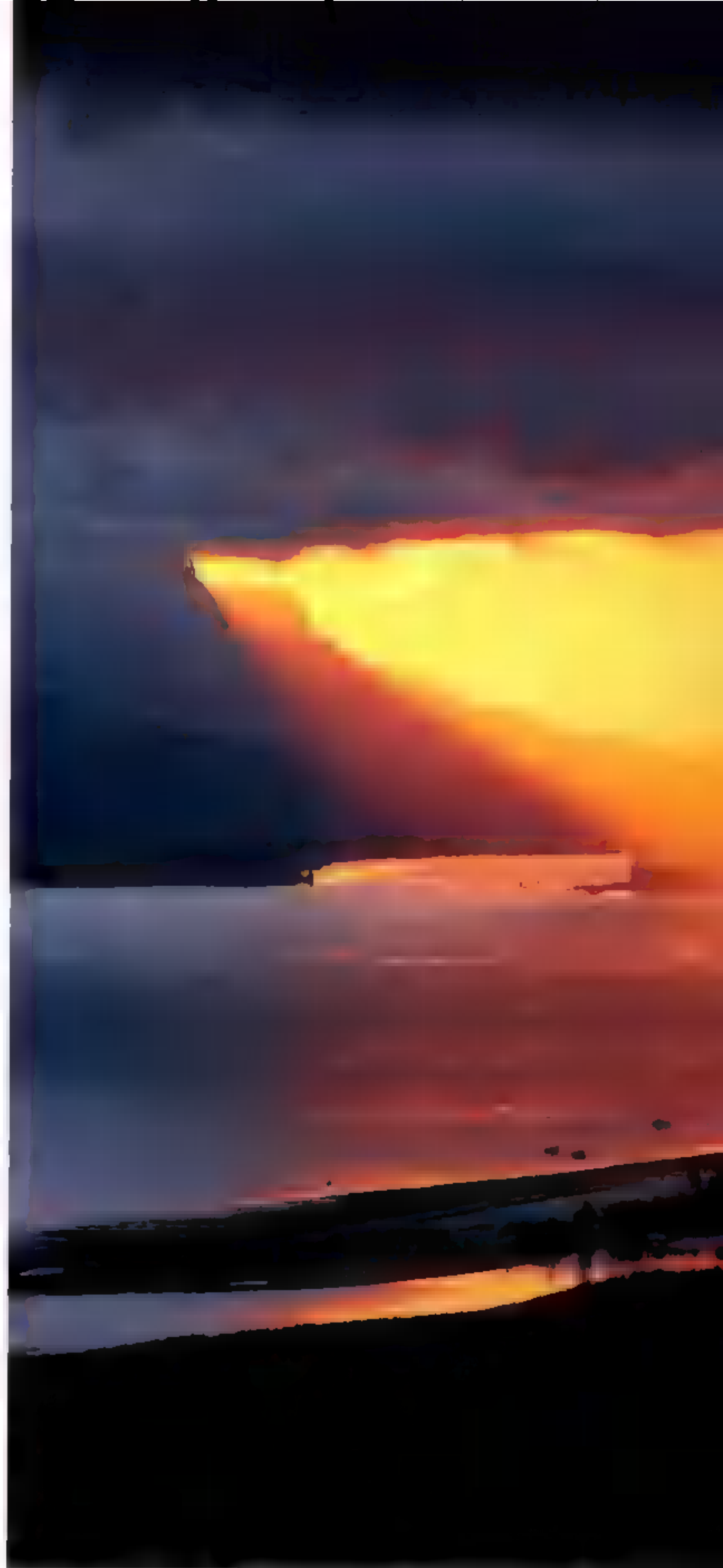
a barge lashed to its bow, held its position in the Columbia River, 140 miles from the Pacific Ocean. It was an idyllic spring evening—the temperature near 70 degrees, the humidity low, a few clouds drifting high across a blue sky.

Rising above the river on both banks were the rugged tree-covered basalt outcroppings of the Columbia Gorge, looking much as they did when Lewis and Clark passed by on their way to the Pacific nearly 200 years ago. At that time between 10 million and 16 million Pacific salmon swam upriver every year to their spawning grounds—one of the largest runs of the fish in North America.

Lewis and Clark would scarcely recognize the Columbia today. Engineers have built 14 dams on its main stem and some 250 more on its tributaries, reducing the free-flowing river to a series of reservoirs. This feat has been the driving force behind the development of the Pacific Northwest, providing inexpensive power for the region and turning the barren high desert of eastern Washington and Oregon into an agricultural Eden.

In the process, however, the dams have wreaked havoc on salmon, the creature that symbolizes the Northwest, whose epic migration from streams to ocean and back again to natal streams is one of the wonders of the natural world. Today perhaps 200,000 to 300,000 wild salmon remain on the Columbia, less than 3 percent of their historical abundance.

That precipitous decline is what brought the *Mary B* and its cargo to



the lower Columbia, which forms the border between Oregon and Washington. Sloshing around in the barge's holds were 77,000 juvenile salmon, or smolts, which had been collected at dams along the Snake River, the Columbia's main tributary. After being piped into the barge, the smolts, most reared in hatchery troughs, were getting a lift downriver for a simple reason: The trip in the water, through eight dams and several hundred miles of slow-moving reservoirs, is too often lethal.

Passing through the lock at Bonneville Dam, the last on the Columbia, the





Mary B cruised a few more miles downstream. On her gray deck high cylindrical aerators spat out water that had circulated through the fish tanks. I watched as a deckhand pulled a lever to flush the salmon into the river. Bubbling and gurgling, the holds emptied like bathtubs, sucking the smolts down a yard-wide drain.

Staring at the dark surface of the Columbia, catching glints of the fish as they began their journey to the Pacific, I was struck by the outlandishness of the *Mary B*'s mission. There, in one of the few remaining stretches of the river that still looked like a river, hovering in a

Scoured by Ice Age floods, the Columbia Gorge cuts through the Cascade Range, inspiring as much awe today as it did for Lewis and Clark. Millions have enjoyed the view from Vista House, foreground, near Portland.

current that once was a huge salmon highway, I was watching fish being shipped down the Columbia like express cargo.

The U.S. Army Corps of Engineers says its program has helped save the few remaining wild Snake River salmon from extinction, reporting that 98 percent of the barged smolts

survive the trip past Bonneville Dam. There's just one problem: The fish go out, but they don't come back. Of the roughly 15 million to 20 million juvenile fish shipped annually in recent years, less than one percent have returned to spawn—well below the 2 to 6 percent needed to sustain Snake River salmon runs.

The failure of this and numerous other programs, which have cost two billion dollars, to rebuild wild salmon runs has ushered in a new chapter in the history of the Columbia River. Once, few questioned that a dammed “machine river” was a good thing. Now, the unthinkable has come to dominate the debate on the Columbia and the Snake. Biologists, environmentalists, Indian tribes, and commercial and sport fishermen say the time has come to dismantle a portion of this spectacularly

engineered river system. Their target? The four dams on the lower Snake River, the tributary that once was home to at least a third of the Columbia Basin's bountiful salmon run. They want to tear down a portion of each dam, returning 140 miles of the Snake River to its free-flowing, salmon-friendly state.

“We have taken the Columbia River system beyond the point of balance, and the question now is, do you undo some of this development?” said Michele DeHart, the manager of the Fish Passage Center, which monitors salmon on the river. “In the end we're facing a decision of breaching the dams or letting these Snake River salmon go extinct.”

But in the Pacific Northwest, where hydro-power has long symbolized economic might, talk of doing away with four dams has elicited

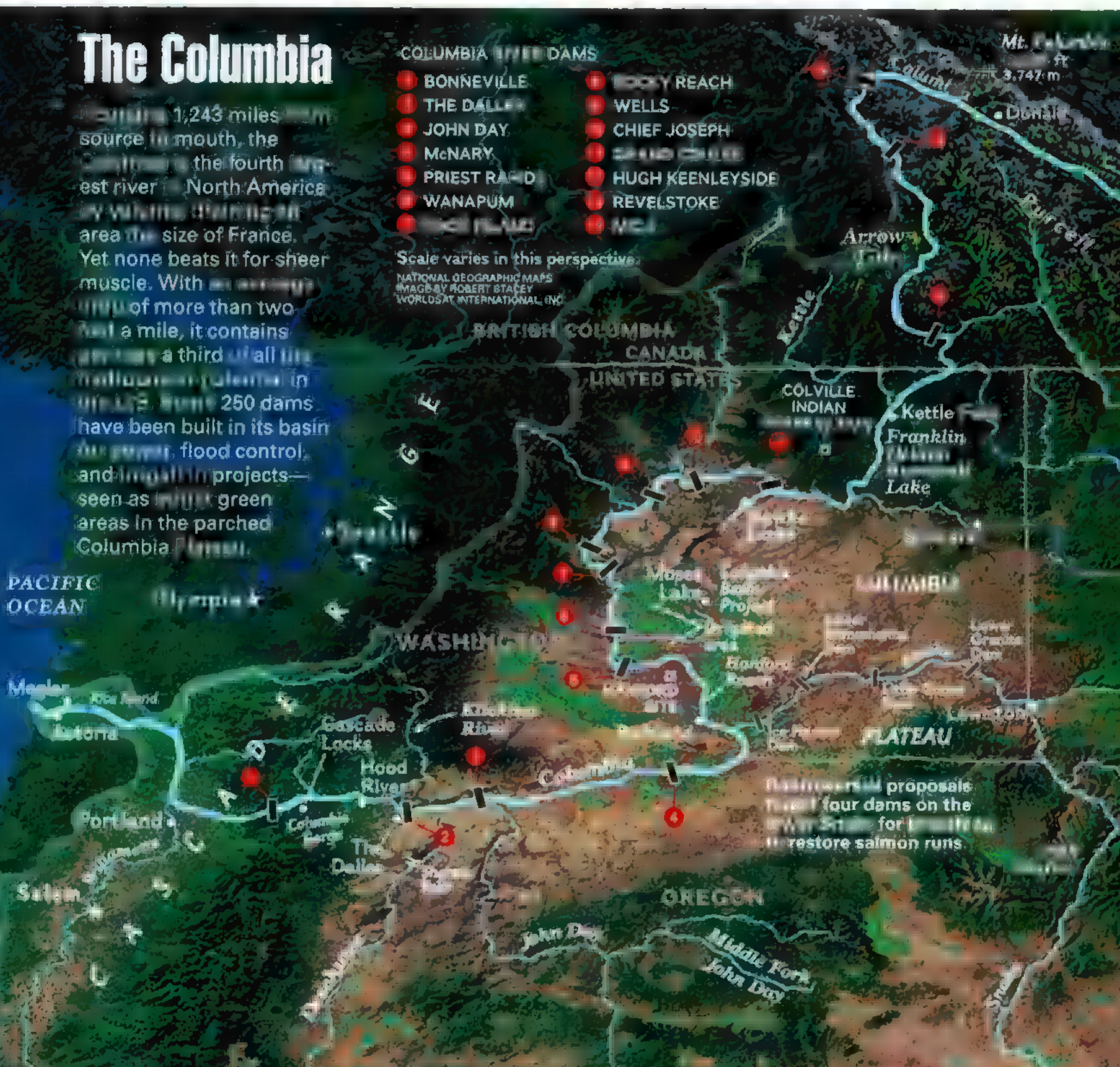
The Columbia

Stretching 1,243 miles from source to mouth, the Columbia is the fourth largest river in North America by volume of water and area the size of France. Yet none beats it for sheer muscle. With an average flow of more than two feet a mile, it contains nearly a third of all the hydraulic potential in the U.S. Some 250 dams have been built in its basin for power, flood control, and irrigation projects—seen as lush green areas in the parched Columbia Basin.

COLUMBIA TRIBUTARY DAMS

- BONNEVILLE
- THE DALLES
- JOHN DAY
- McNARY
- PRIEST RAPID
- WANAPUM
- HOOD RIVER
- BOOY REACH
- WELLS
- CHIEF JOSEPH
- SAND CREEK
- HUGH KEENLEYSIDE
- REVELSTOKE
- MCL

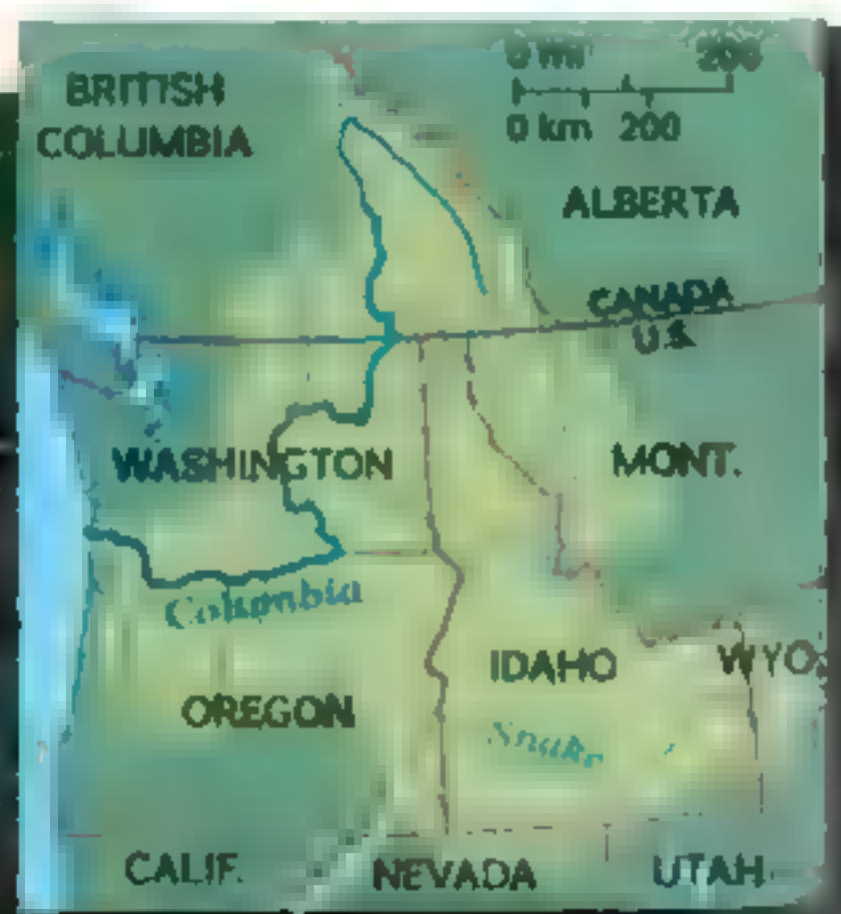
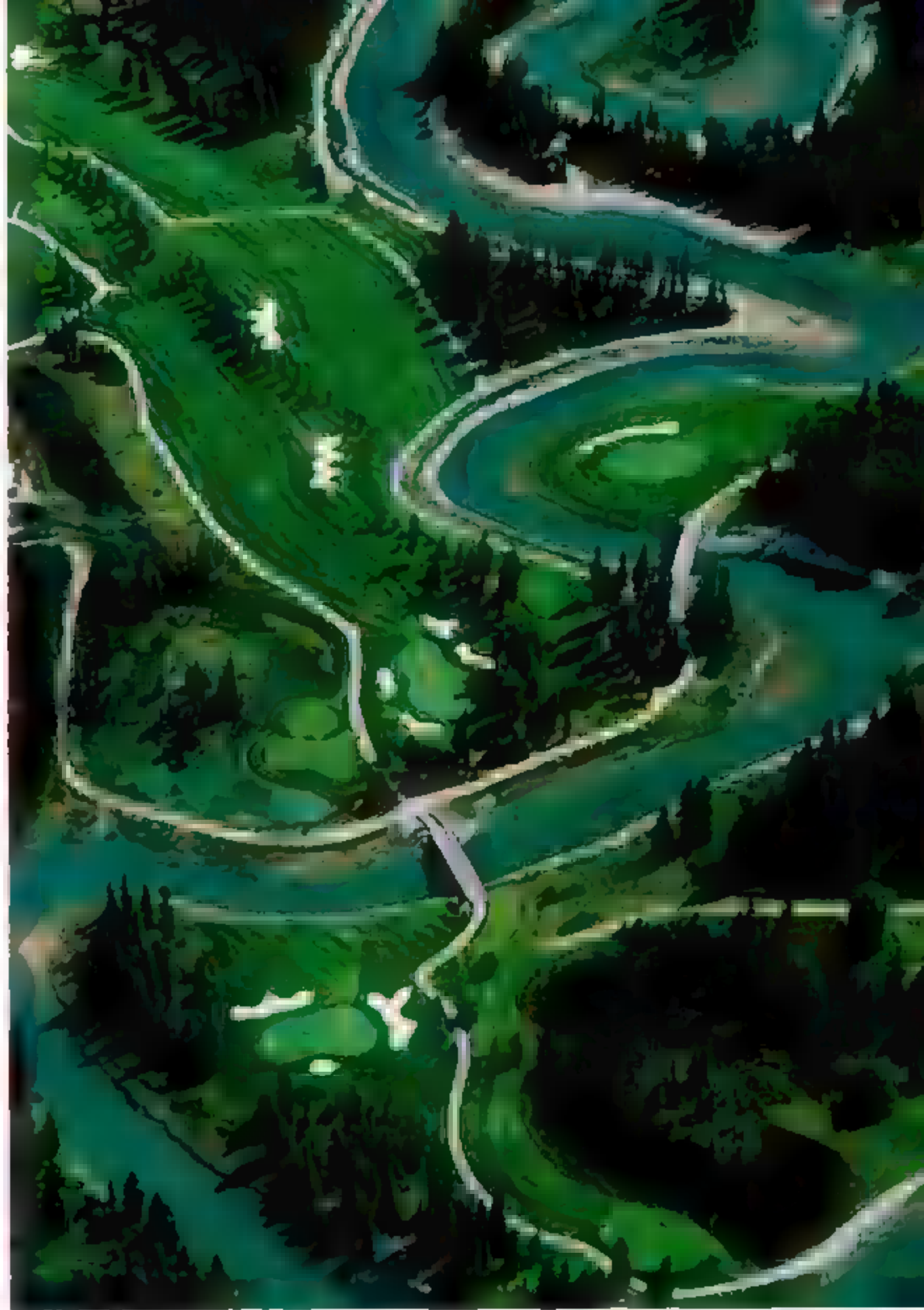
Scale varies in this perspective.
NATIONAL GEOGRAPHIC MAPS
 IMAGE BY ROBERT STACEY
 WORLD SAT INTERNATIONAL, INC.



passionate opposition, particularly from those who depend on the dammed river for transporting goods cheaply.

“The environmentalists would like to see the West turn back to the days of the Indians and the roaming buffalo,” said Jay Penner, a farmer in eastern Washington who might have to pay an extra \$25,000 a year to ship his 250,000 bushels of wheat to market if the dams are breached. “They want to make the West a playground for the rich.”

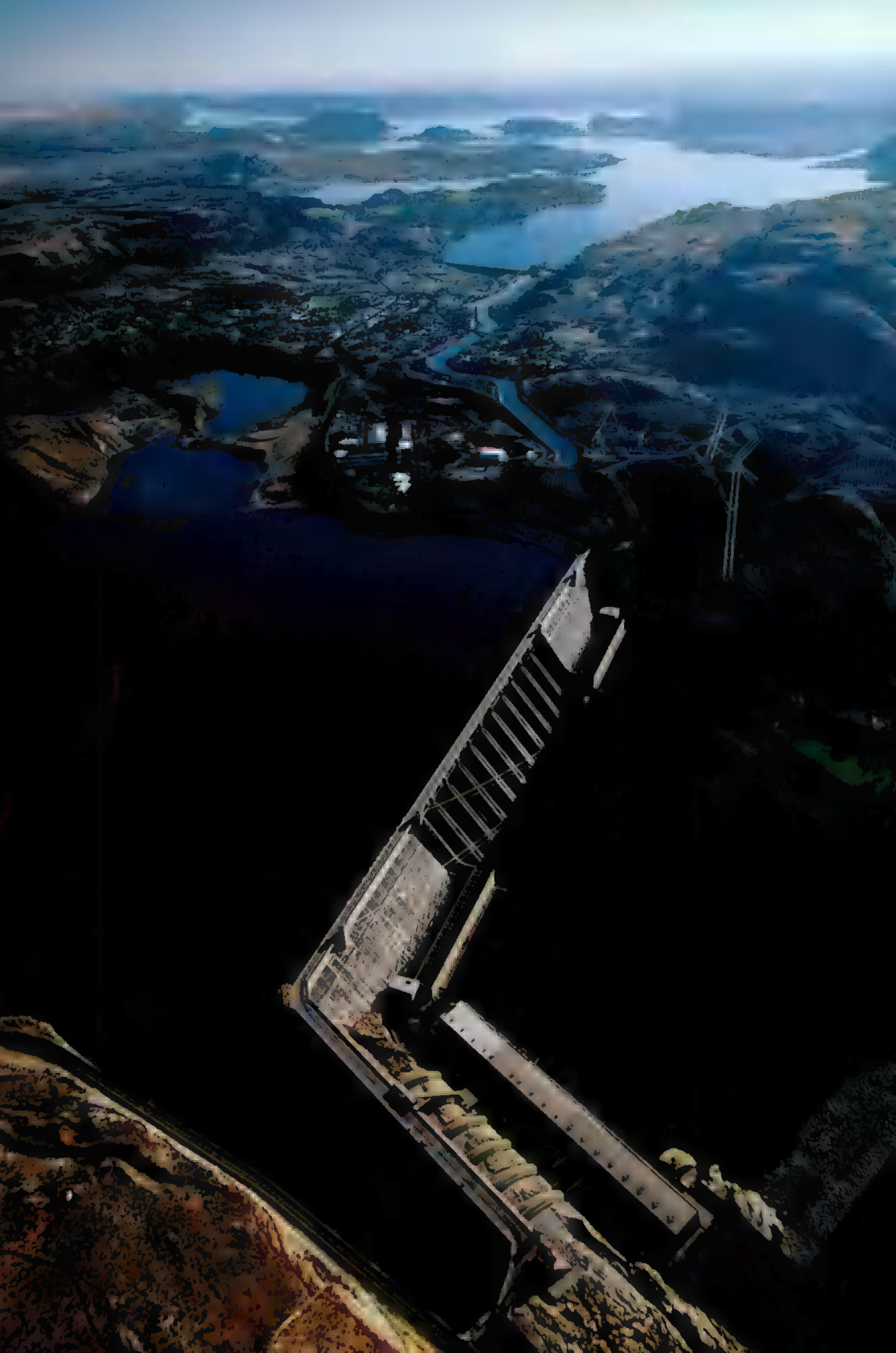
The human touch starts early on the Columbia, which serves as a natural water hazard at the Riverside Golf Resort. Greenskeepers use organic fertilizers to lessen impact on the river, here just a mile from its source in Columbia Lake, high in the Canadian Rockies.



At heart the battle over the future of the Columbia River system is a clash of two world-views, and it has polarized the Pacific Northwest. On the one hand are those, like Penner, who believe that the river—and nature—should be bent to man’s will and that man’s needs take precedence over the creatures in the Columbia. On the other are people like DeHart, who believe that saving Snake River salmon is a test of our ability to coexist harmoniously with nature in the 21st century.

The drive to do away with the dams is part of a larger national movement to “de-engineer” some of the massive flood-control, hydro-power, and irrigation projects that have radically altered large ecological systems such as the Columbia River. In December President Clinton signed a bill providing 7.8-billion dollars to restore natural flows to the Everglades, which has lost 1.7 billion gallons of water a day to a network of canals, levees, and pumping stations for agriculture and development.

Though the sound and fury is now focused on the Snake River, it is only part of the Columbia Basin, which encompasses portions of seven states and one Canadian province and drains an area the size of France. I spent seven



With power to spare, Grand Coulee Dam pumps water into the Grand Coulee, now Banks Lake (left, in background), to irrigate 640,000 acres in the Columbia Basin Project at subsidized rates. Randy Hafer, who benefits from the project, unclogs a nozzle in an alfalfa field. "Without the water we wouldn't be here," Hafer says.

weeks traveling along the 1,243-mile river, from its free-flowing headwaters in the Canadian Rockies to the wide estuary where it collides with the Pacific on treacherous shoals. During the trip my mood swung wildly. One moment I was impressed by the power and irrigation the river provides, and the next, depressed by the subjugation of one of North America's great rivers and the decimation of its salmon runs.

TO SEE THE COLUMBIA as it once was, you need to travel to Canada, where the river comes into being amid majestic surroundings. From the snow-covered, 10,000-foot peaks of the Purcell Mountains to the west and the towering, jagged Kootenay Range of the Rockies to the east, snowmelt and springwater empty into ten-mile Columbia Lake, the headwaters of the river. The 110-mile stretch streaming north from the lake is one of only two free-flowing, nontidal sections of the river. As it meanders through a mile-wide bottomland thick with cottonwood, willow, and spruce, the river is a network of braided channels, ponds, and wetlands, home to otters, wolves, and wintering elk and deer.

This uppermost valley of the Columbia is also a prime corridor for migrating birds, and on a cool, cloudless evening I joined local naturalist Bill Swan to observe some of the 264 species that have been recorded in the valley: bitterns, black terns, goldeneyes, ospreys, and loons. We counted birds until the setting sun lit up the snowy summits of the Kootenays with a rose-colored light. Surveying the lakes and channels, Swan said, "What you see here, this cottonwood floodplain, is what used to exist all along the river. Now this is the only stretch like it that's left."

All that's missing is salmon. Just 60 years ago roughly 25,000 salmon still migrated into northern Washington and British Columbia, with thousands swimming all the way to



the headwaters. Many of the fish were the renowned "June hogs," giant, 60-pound spring chinook. But Grand Coulee Dam, completed 600 miles downstream in 1941, put an abrupt end to the salmon runs. Five hundred fifty feet tall and with no fish ladders, Grand Coulee was an engineering marvel and a salmon exterminator, eliminating a thousand miles of main-stem and tributary salmon habitat.

The epic thousand-mile runs of Columbia River salmon into the mountains of Canada and Idaho demonstrate why endangered species listings of the fish have caused far more public concern than the plight of other animals, such as the spotted owl. Pacific salmon begin their lives as fertilized eggs in gravel in clear, cool streams.* After hatching, the young fish remain in fresh water for up to two years. Triggered by genetic impulses, they begin their migration, usually during the spring freshet, to the ocean. They spend several years there, traveling as far north as Alaska. Then the genetic alarm clock rings again, and the salmon are driven to return to their native streams. Entering the Columbia, the salmon cease feeding

*See "Long Journey of the Pacific Salmon," by Jere Van Dyk, NATIONAL GEOGRAPHIC, July 1990.

and begin the migration upriver, losing fat as they ascend, their bright silver color slowly darkening. Following the olfactory clues stored in their brains, they return up the main stem, then up their home tributaries, very often back to within a few hundred yards of where they were hatched. There the salmon spawn and die. Of all the Pacific salmonids, only the steelhead does not die after spawning.

Because of this extraordinary journey Pacific salmon are highly vulnerable, their numbers reduced by logging and farming, which smother spawning grounds in silt; by irrigation, which can dry up streams; by fluctuating ocean conditions, which reduce food supplies; and by overfishing. Then, of course, there are the dams.

JUST DOWNSTREAM of the Canadian town of Donald the first of the long impoundments on the Columbia appears. British Columbia has built three dams on the main river and others on tributaries. (In exchange for payments, three of those dams provide flood control and store water for power generation in the United States.) Dam construction on the Canadian stretch of the Columbia has created thousands of jobs and provides half of British Columbia's electricity. The costs have been high, however, with the dams forming huge reservoirs that displaced 2,300 people and flooded bottomlands.

Canadian officials were hopeful that their lakes would become prime tourist attractions, but things turned out otherwise. With the U.S. manipulating water levels for power generation and flood control, residents have watched in dismay as reservoir heights have fluctuated by as much as 200 feet in a few months. Boats have been left high and dry, and exposed sands have blown about like those in the Sahel. For the most part developers have stayed away.

"The Army Corps of Engineers just picks up the phone and out goes the water the next morning," says Denis Stanley, former publisher of a local paper, who lives on Arrow Lake, the reservoir behind Hugh Keenleyside Dam.

The Columbia rolls out of the Canadian Rockies and into the spruce-and-pine-covered hills of northeastern Washington. Soon you see the first sign of the river's engineering wonder, Grand Coulee Dam. The concrete is still far to the south, but Grand Coulee is so massive that the Columbia's waters back up 150

The river's energy hits the grid at the 230-kilovolt switchyard of Grand Coulee Dam, where the air literally hums with power. Transmission lines carry two billion watts—twice enough to run Seattle—to cities as far away as Los Angeles and Missoula, Montana.

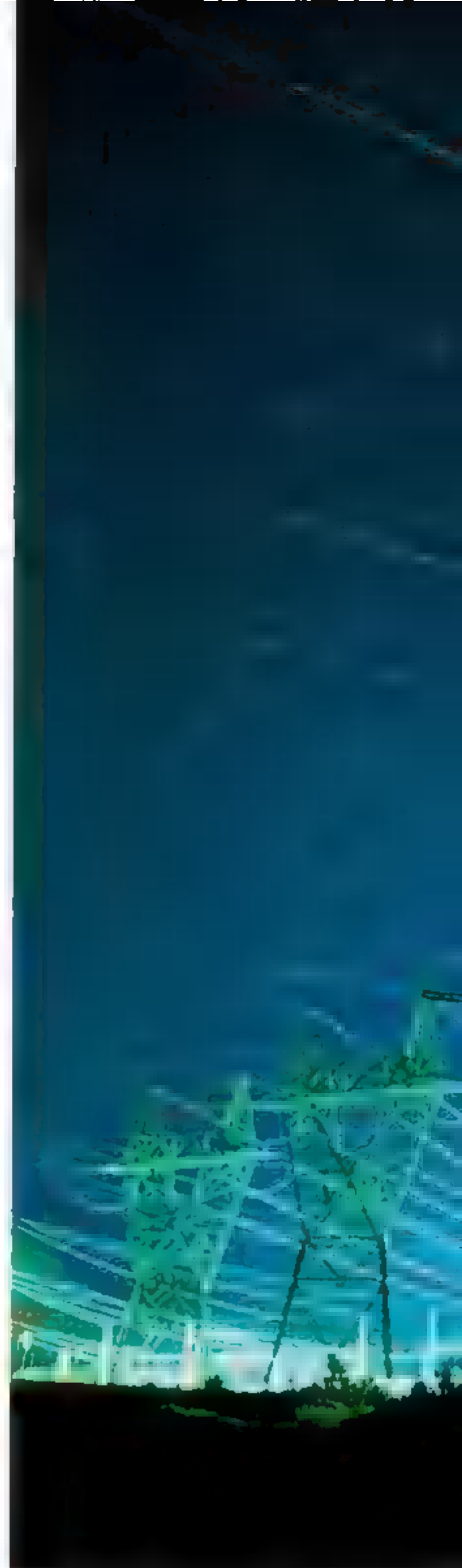
Power

Dams generate more than half the electricity in the Pacific Northwest.

Two billion dollars of power revenues has been spent on salmon restoration, but runs continue to decline.

miles behind it, forming Franklin Delano Roosevelt Lake, known locally as "the pool." Almost imperceptibly as you head south along Lake Roosevelt, the forested landscape gives way to the khaki-colored high desert that predominates along the river to the Columbia Gorge. Nearing Grand Coulee, a thicket of transmission towers and power lines soars above the scrubby terrain. Then there's the dam, a hulking, gray, mile-wide plug in the river containing enough concrete to build a sidewalk that could circle the Earth two times at the Equator.

No better symbol exists of how man has





altered the river, in ways both good and bad, than Grand Coulee Dam. Built during the Depression, the dam's benefits were manifold. It put 7,000 people to work, created a reservoir for the biggest irrigation project the country had ever seen, provided flood control, and produced electricity that would power America's war effort. At the time, it was the largest concrete structure ever built. Today Grand Coulee generates more electricity than any other dam in the U.S., enough for a million households a year. It is the centerpiece of a 29-dam federal hydropower system in the Columbia Basin that has enabled the Bonneville Power Administration to provide electricity to Northwesterners at half the average cost nationally.

As for irrigation, the benefits are evident the minute you leave the parched sagebrush country and enter the Columbia Basin Project.

Mile after mile is covered in fields of potatoes, onions, carrots, corn, and grain. In innumerable orchards plump apples dangle from the branches of dainty trees. Sprinklers water ground that otherwise receives only six to ten inches of rain a year. All this is made possible by the dam's power, which pumps water 280 feet up into 27-mile-long Banks Lake, a huge natural coulee formed by great floods that scoured the Columbia River 15,000 years ago during the last ice age. From there the water flows through 6,000 miles of canals, pipes, and ditches to more than 2,000 farms. The result: 640,000 acres under cultivation.

Some measure of the project's bounty can be seen from its potato crop. In 2000 the basin grew 95 percent of the 5.4 million tons of potatoes produced in Washington State, whose yield was second only to Idaho's. The basin also



grew 40 percent of all the potatoes that went into making french fries and frozen potatoes in the United States.

Bill Watson is a 72-year-old farmer who started cultivating the land in 1962, ten years after the water began flowing. I met Watson on a sparkling fall evening—the kind you’d expect in a place where it rarely rains—under a vast, cloudless blue sky. Taking a break from supervising his potato harvest, Watson hopped off his tractor to say hello. He was an amiable, robust man of medium height with a healthy head of gray hair.

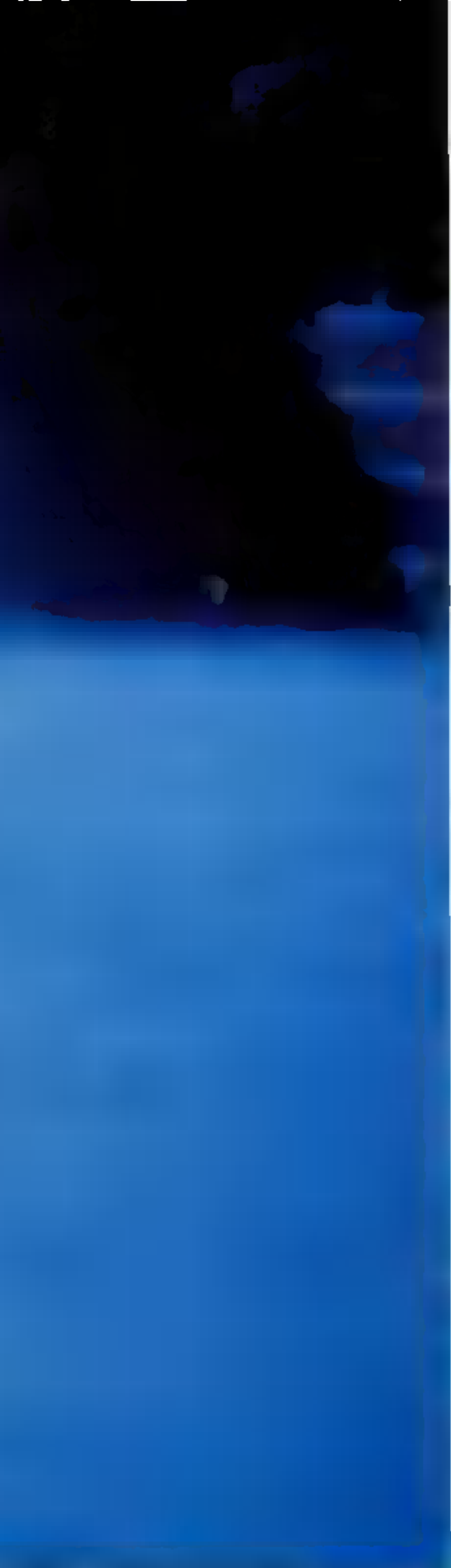
“We’re hurrying like a son of a gun,” he said. “These will all be french fries, and they’ll probably wind up in McDonald’s or Burger King. They’re Russet Burbank, and they’ve got a good fry color.”

Watson farms 1,200 acres—325 in potatoes,

300 in onions, and the remainder in apples, pears, sweet corn, wheat, and peas. The next day, riding in a pickup truck with the license plate “Onion 1,” he showed me his orchard, pointing out the canals and ditches that bring the Columbia River up onto his land.

“In the old days people were at the whim of nature here,” said Watson, who put three daughters through college thanks to the Columbia Basin Project. “If they didn’t have the rainfall, they didn’t have anything. The wind would blow, and the dust would blow, and, holy mackerel, it was terrible. And then they got the water, and it changed everything. The people that thought about this, what vision they had. It was fantastic.”

Critics of the project contend that the cornucopia has cost U.S. taxpayers dearly. The project has been heavily subsidized:



Using timeless techniques, tribal fishermen dip for salmon at Sherars Falls on the Deschutes River, a Columbia tributary. Their ancestors gave up land in the 19th century to reserve fishing rights here and all other traditional fishing grounds.

Industry
Cheap electricity lured lucrative industry—aluminum, aircraft, defense.

Fishing centers on the Columbia became ghost towns, and the region's economy is still losing 500 million dollars a year.

Irrigators are paying back only a fraction of the construction costs of Grand Coulee and the irrigation system, and they are charged a tenth to a twentieth of the market rate for the power used to pump water from Lake Roosevelt into Banks Lake. But Watson sees things differently, saying the government has made an investment—in hydropower and agriculture—that has strengthened America.

Driving along a concrete canal brimming with the dark, swiftly flowing Columbia, Watson said, "I never tire of looking at the water running through those canals. Without that water—jimmy, I hate to think about it."

NOT A DROP of Columbia Basin Project water went to the Indian tribes, including the Confederated Tribes of the Colville Indian Reservation, whose prime hunting, gathering, and fishing grounds were inundated by Lake Roosevelt. In a canyon just downstream of Grand Coulee I visited Vern Seward, one of the few people who remembered the celebrated fishery at Kettle Falls, flooded 60 years ago. The son of a Sanpoil Indian mother and a father who was part Native American, Seward, 82, lived in a white trailer with the Columbia flowing past his backyard. He spent the summer of 1932 spearing salmon at Kettle Falls.

As they had for millennia, scores of Native Americans camped in tents and tepees at the 20-foot falls, harvesting huge chinook salmon, which they dried for later use. The fish rested in the eddies after trying—and failing—to leap over the falls.

"They'd get tired out, and we'd stand on top of the rocks right below the falls and spear them," recalled Seward, who worked construction at the dam from 1932 to 1940. "The average weight would be right around 30 pounds. We went out at night and speared fish too. We'd cut the top off a pine tree, put it in a basket, light it, and spear fish in their spawning beds. You could see the salmon as clear as daylight."

Proof that such a fishery once existed, and that Seward experienced it, hung on his wall: a grainy, black-and-white photograph of the young Indian straining to hold aloft a 50-pound chinook.

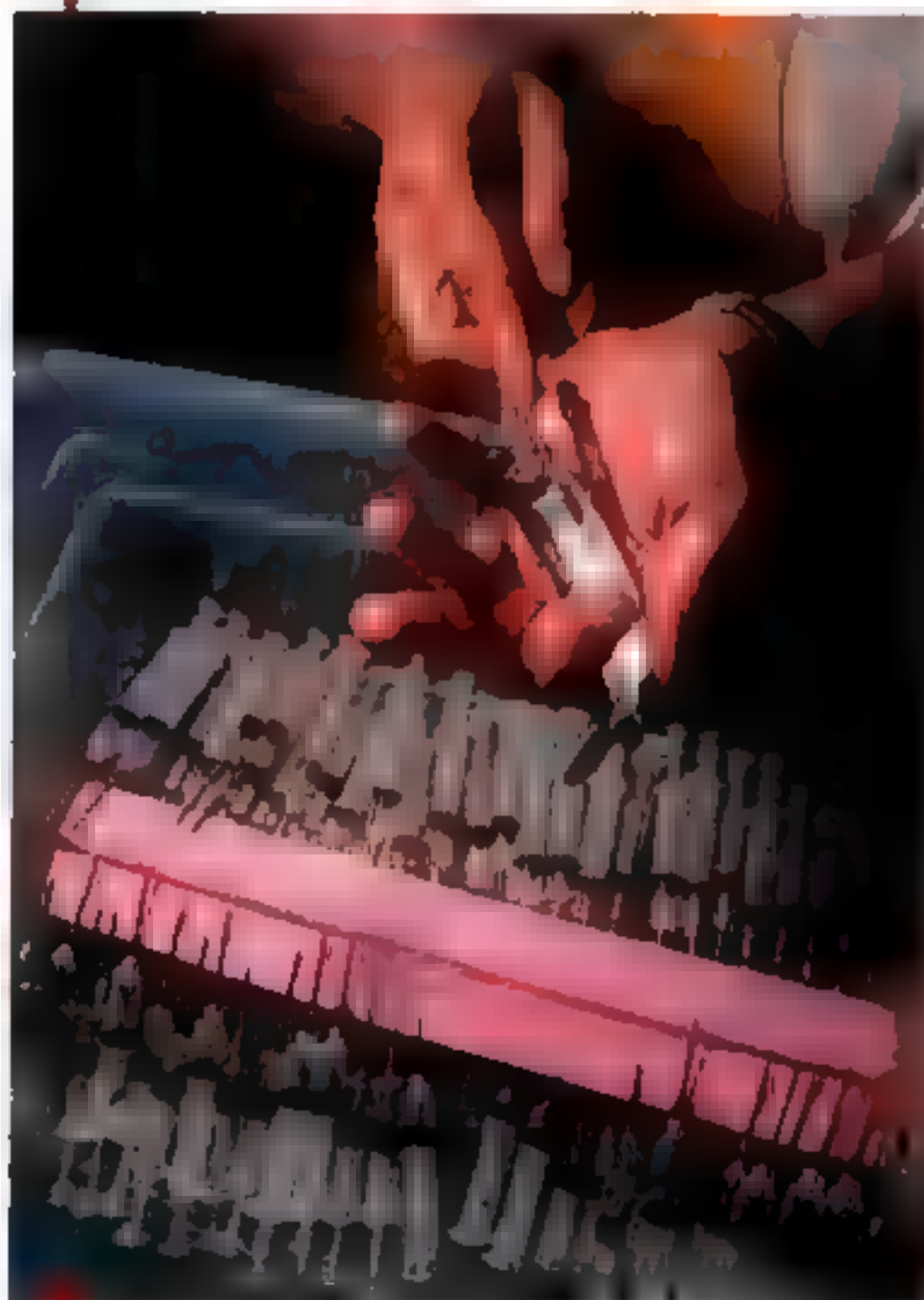
"To see these big salmon come up and jump and hit right on top of the falls—it was a thrill," said Seward, who died five months after we spoke. "Oh, God, they were powerful. I was amazed that the salmon could come clean up from the ocean, miles and miles up the river, and they knew exactly where to spawn."

Native Americans still fish along the Columbia and its tributaries, although the harvest is restricted and the season short. In October I watched as Yakama Indians, employing a fishing technique eons old, stood on wooden platforms and used long dip nets to pull salmon out of the boiling, green waters of the narrow Klickitat River. Federal courts have ruled that Columbia tribes are entitled to 50 percent of the harvest on the river, a decision based on 1855 treaties under (Continued on page 24)



And they swam and they swam . . .

The multimillion-dollar fish cruise



It seemed the perfect solution at the time. Salmon and steelhead smolts were having trouble getting downstream past eight dams on

the Snake and Columbia Rivers. Yet wheat barges made the run in two days. A light-bulb went on at the National Marine Fisheries Service (NMFS), and in the mid-1970s Operation Fish Run was born. Today the NMFS and the Army Corps of Engineers barge or truck three-quarters of all salmon and steelhead smolts in the Snake River to release points below Bonneville Dam. First smolts are diverted to collection pens and pumped into specialized barges (right), shown here at Lower Granite Dam. Sample smolts are sent to labs (left), where workers insert

a transponder that enables electronic sensors at dams to monitor their passage downstream and back a few years later. Fish barges like






one passing through Bonneville Lock (right) circulate river water to imprint the route on smolts. “Ninety-eight percent survive the trip,” says Corps spokesman Dutch Meier. “That’s far less mortality than current in-river losses.”

Critics contend that fact is irrelevant. “What they don’t say is that almost none of the smolts come back as adults,” says fisheries biologist Scott Bosse of Idaho Rivers United, a Boise-based group fighting for dam removal. “Two percent return is the break-even point to maintain the population. In the 25-year history of barging they have never hit 2 percent.” Other fish-passage aids, such as the spillways for smolts and fish ladders for adults at Ice Harbor Dam (top left), have had



mixed results. Spilling water gets smolts downstream quicker but fills the water with nitrogen bubbles that can be fatal to fish. Ladders help adults over dams but may leave them too tired to spawn. Only on free-flowing

stretches like the Hanford Reach (top) do wild fish thrive. “Nobody ever said that salmon and dams were made for each other,” the Corps’s Meier says. “People needed power. It was a public policy choice.”



Genetically hard-wired to find her native stream, a wild chinook digs her redd, or nest, on the Middle Fork of the John Day River after surmounting three Columbia dams. Habitat restoration here may have been a factor in the return of strong spring runs.





The Cold War's toxic legacy lingers at the Hanford Site, where an estimated 10 billion gallons of radioactive liquid waste was discharged into the soil, eventually reaching groundwater. Plutonium-production reactors cooled their cores with river water and discarded it laden with cesium, chromium, and cobalt. The 50-billion-dollar cleanup may take 30 years.

Irony

Fifty years of bombmaking left the Hanford Site saturated with radioactive pollution.

For security, the Hanford Reach wasn't dammed. It now supports the healthiest run of wild salmon on the river.

which tribes ceded more than 40 million acres, moved to reservations, and reserved the right to continue fishing at their "usual and accustomed" stations. As the battle over salmon and dams continues, the 1855 treaties—which affect four major tribes—are a hefty legal stick that, along with the Endangered Species and Clean Water Acts, may be the determining factor in breaching the Snake River dams.

Today the tribes are also playing a leading role in reforming hatcheries, which for a century have flooded the Columbia system with domesticated smolts—often more than a hundred million annually—at the expense of their wild cousins. Critics have likened the hatchery programs to a blood transfusion that has kept salmon numbers artificially high; in the past decade roughly 80 percent of the million adult salmon and steelhead that have

migrated up the Columbia annually have been hatchery fish, which are less suited to survive and reproduce in the wild.

SIX DAMS block the Columbia in one 200-mile stretch downstream of Grand Coulee. The dams, and the pools behind them, disrupt the salmon's migration in many ways. Surprisingly, the adults' upstream migration is not the major problem, provided dams are fitted with fish ladders—wide, concrete waterways that guide the salmon above the dam. Only a small percentage of the run is stopped by each dam. The lethal part

comes when the smolts migrate downstream. The turbines kill not by grinding up the fish, for the blades are huge, but rather by exploding their swim bladders as they are forced through the powerhouses at high pressure and speed. Studies have shown that 8 to 10 percent of migrating smolts are killed at each dam and pool. The reservoirs flood the gravel bars where salmon spawn, greatly increase the time it takes smolts to move from streams to ocean, give predators more time to gobble up smolts, and heat up water, increasing mortality.

Below the last of these dams, Priest Rapids, something strange happens. The river narrows, picks up speed, and soon you're on the Hanford Reach, the only nontidal, free-flowing stretch of the Columbia in the U.S. The 51-mile reach harbors the healthiest run of wild salmon on the main-stem Columbia, an estimated 30,000 spawning fish. Last year President Clinton designated this portion of the river a national monument, protecting it from development.

The Columbia here is undammed because of a quirk of national security: It runs through the Hanford Site, where from 1943 to 1989 the government produced plutonium for the nation's nuclear arsenal. Portions of the 560-square-mile site became terribly polluted as workers dumped 40 billion gallons of contaminated water directly into the soil, and radioactive material leached into the earth from storage ponds and tanks. Groundwater contaminated by small amounts of radioactive tritium is still seeping into the river, although the massive volume of the Columbia dilutes the tritium so rapidly that the city of Richland, Washington, just downstream, draws its drinking water directly from the waterway.

The U.S. Department of Energy is now carrying out a 50-billion-dollar cleanup, employing the same number of people, 10,500 on average, who once made bomb material. The effort involves, among other things, digging up ten million tons of contaminated soil along the Columbia and removing 54 million gallons of radioactive waste stored in 177 underground tanks, about a third of which are leaking.

Notwithstanding this massive cleanup, most of the Hanford Site—and the Hanford Reach—has remained untouched, and as a result salmon and steelhead have thrived. Richard Steele, a retired Hanford worker who has

devoted 35 years of his life to fending off efforts to dam and dredge his beloved stretch of the Columbia, acted as my guide. As we cruised upstream in his jet boat, we passed mile after mile of prime spawning habitat—wide shallow bars of copper-colored cobble and gravel. The river, 400 yards wide, was moving smoothly and swiftly, the current boiling up from the clear green depths. "Man, that's a river," said Steele, a trimly built man with curly gray hair. "This thing's really carrying the mail."

High white-clay bluffs swept in a long, graceful arc around a bend. We saw coyotes and deer amid the sagebrush scrub of the Hanford Site. In places the gray concrete carcasses of old reactor buildings jutted up from the desert.

Not far below the Hanford Reach, the Columbia is joined by the 1,038-mile Snake River. At the confluence, amid the brown hills, concrete grain elevators overflow in the fall, forcing shippers to pile wheat in great, golden pyramids near the river.

With its headwaters in Yellowstone National Park, the Snake River Basin encompasses some of the wildest land on the continent, including 5.6 million acres of wilderness area managed

Biologist Steve Ellis examines deformed fish caught just off the Columbia at a Willamette River Superfund site. High deformity rates along some Willamette stretches may result from agricultural and industrial pollutants.



by the National Forest Service. Its thousands of miles of mountain streams constituted one of the great salmon and steelhead nurseries of the Columbia, supporting a run of several million fish. Those runs declined with overfishing, mining, logging, and dambuilding in the first half of the 20th century, but it wasn't until the U.S. Army Corps of Engineers completed four dams on the lower Snake in the 1960s and '70s that wild salmon and steelhead runs on the river plummeted, falling from an average of about 130,000 annually in the late 1960s to about 15,000 in the late '90s.

Those numbers doubled to about 30,000 last year, reflecting a jump in salmon and steelhead returns in the Columbia system as a whole. Opponents of breaching say this improvement is proof that less radical fish-restoration efforts are working. But many biologists attribute last year's higher returns to improving ocean conditions and recent years of exceptionally high runoff that sped smolts to the sea. The increase, some biologists say, may be no more than an upward blip in a continuing downward trend.

Snake River coho salmon became extinct in 1986. Since then, four stocks of Snake River steelhead and salmon have been placed on the federal endangered species list, including sockeye, whose numbers dwindled to one wild fish in the 1990s and are now being slowly rebuilt using a captive brood-stock program. (Eight stocks of Columbia River salmonids are also on the list. Together, the Snake and Columbia are home to half of all the endangered or threatened salmon and steelhead stocks in the Pacific Northwest.)

The Salmon River, a tributary of the Snake, is typical of the superb spawning habitat found in Idaho. In a canyon at 6,000 feet I watched as a dozen chinook salmon maneuvered in a spawning ritual, the males jockeying for position as the females rolled on their sides and fanned their tails, digging redds, or spawning beds. Not far away, along Marsh Creek—located in an alpine meadow set amid the jagged Sawtooth Range—state biologists counted only 36 redds last year, compared with 400 to 500 in the mid-1960s, a clear sign of withering wild salmon populations.

"These dams represent the biggest change in the salmon's ecosystem since the last ice age," Ed Bowles, then the Idaho Department of Fish

and Game's chief salmon biologist, told me as we searched for redds on the South Fork of the Salmon River. "From a biological standpoint the only way to recover these fish with a high likelihood of success is to breach the dams."

THE FOUR LOWER SNAKE DAMS would cost about a billion dollars to breach, but they are nevertheless a tempting target. Unlike dams on the main-stem Columbia, such as Grand Coulee, they were not designed for flood control. Only one of the four dams is used for irrigation, providing water to fewer than 20 farms with 37,000 acres of cultivated land. The dams together supply about 5 percent of the Pacific Northwest's power, but many in the region say they would pay higher electricity bills if it meant saving salmon runs. In 1998 a panel of independent biologists, agreeing with Bowles, said breaching was the best way to save the fish; they concluded that Snake River chinook would have an 80 to 100 percent chance of recovery within 24 years after the dams were removed.

The rub is that decision-makers must consider more than just the salmon. The Snake River dams opened up the Port of Lewiston, 465 miles from the Pacific, to barge traffic in 1975, and many people have come to rely on this cheap and efficient transportation for wheat and goods such as paper products. Several thousand Snake watershed farmers, as well as farmers from as far away as the Dakotas and Montana, use the river to ship their grain to market. One 3,500-ton barge carries the same amount of wheat as 35 train cars or 134 trucks, offering great economy. If the dams are breached, farmers might have to pay 10 to 30 cents more a bushel for shipping, an added cost that, given the current low price of wheat, would likely drive some farms out of business. That, said David Doeringsfeld, manager of the Port of Lewiston, is typical of the pain that would be inflicted if the dams are breached.

"The Snake River is integral to the Lewiston area," said Doeringsfeld, claiming that 1,500 jobs could be lost if the dams go. "We've built an economy around this river system."

Many along the lower Snake question whether breaching the dams would revive salmon runs and dispute the notion that Snake River salmon are inevitably headed toward extinction. Some even argue that extinction



Heavy winds make the Columbia Gorge a sailboarder's Valhalla. Sean Sanders of Scotland (top, at center) and friends wait for ■ to start "nukin' " ■ Rowena sailpark. Echoing an old tradition, Yakama fishmonger Simon Sampson (above) sells ■ coho salmon at Cascade Locks during the brief commercial season.



Hardy souls cross the Columbia during the 58th Roy Webster Labor Day swim held in Hood River, Oregon. The event honors a local legend who embodied the town's adventurous spirit.





Returning spring chinook face ■ “hog line” of fishermen on the Willamette River, where the sport is almost ■ cult. Downstream, young Caspian terns fight over a smolt on Rice Island in the Columbia. Nearly all salmon caught by terns and anglers are hatchery fish, whose abundance has masked native fish declines.

is an acceptable price to keep the economy on track. Jay Penner, the wheat farmer, doesn't want to see Snake River salmon eliminated, but, he says, "Can we really save everything? This is part of nature. There are things that go extinct all the time."

Penner and others also maintain that it would be foolhardy to breach dams at a time of growing power shortages in California, which receives electricity generated in the Columbia River Basin.

Those who would dismantle the dams contend that a free-flowing lower Snake, while eliminating barge transportation, would usher in a new economy worth hundreds of millions of dollars annually based on tourism, angling, and recreation. They note that people fighting for their jobs along the Snake seemed unconcerned that as the dams went up and salmon runs fell, thousands of workers in the commercial and sportfishing industries lost their jobs. Breaching proponents say that plans to remove the dams should include funds to compensate those harmed and to improve roads and rail lines in the area. Millions of dollars now being spent on saving Snake River salmon could be used to offset losses to the Lewiston area. But such promises ring hollow to those whose livelihoods depend on the dams.

One evening in Lewiston I hopped on a tugboat owned by Tidewater, the largest barge line on the Columbia and Snake Rivers. The tug was pushing three grain barges and a fourth piled high with wood chips. I rode with Capt. Mike Murphy, 60, and his crew for 18 hours as they traveled 140 miles down the Snake to the Columbia, through the four targeted dams. At dusk we cruised slowly through canyons where basalt cliffs and arid hills loomed above us. Darkness fell, and the sky filled with stars. As we passed through the dams, I was impressed by Murphy's ability to guide the load, nearly twice as long as a football field, into concrete locks with only a foot to spare on each side.

"They were opening up a whole new empire when they built these dams and brought the backwater up here," Murphy told me as we sat together in the wheelhouse. "It's created a lot of new jobs."

To Murphy, breaching the dams is unthinkable. "Why do they want to do that? For the fish? When there's no guarantee the fish

will come back? It just doesn't make sense. I hauled the first load of wheat out of here in 1975, and I sure don't want to be the one to haul the last load out."

BELOW THE SNAKE RIVER the Columbia is blocked by four more dams. East of Portland the river runs through the Cascade Range at the Columbia Gorge, a breathtaking 80-mile cut that demarcates the arid territory east of the mountains from the lush terrain to the west. Farther downstream—flowing freely and affected by tides—the river courses through the Portland metropolitan area, its banks lined with paper mills, aluminum smelters, log yards, and grain terminals that ship 40 percent of U.S. wheat exports, mainly to Asia and the Middle East.

Twelve hundred miles from its source in the Canadian Rockies, the Columbia River flows past the once thriving fishing port of Astoria, Oregon, and empties into the Pacific Ocean. It was at Astoria in the late 1800s that the first great blow to salmon was dealt, when commercial fishermen hauled out as much as 43 million pounds of salmon and steelhead a year.

The commercial catch declined to the still sizable level of 25 million pounds a year in the 1930s, before the dambuilding boom. Today the catch is around one to two million pounds a year. Fishing-industry representatives claim that at least 10,000 jobs on the Columbia have been lost because of the decline of salmon.

Steve Fick of Astoria has witnessed the decline. A stout bespectacled man with brown hair, he has been a commercial fisherman for most of his 43 years. He owns one of the four fish-processing plants on the lower Columbia River that still handle salmon, down from two dozen canneries early in the 20th century. On a cool, overcast day I went fishing with him just off Astoria, a picturesque stretch where a graceful green bridge arches over the river from Astoria to Megler on the hilly, heavily wooded Washington shore. Taking advantage of one of the limited periods when the Columbia is open to commercial fishing, Fick chugged out of Astoria's harbor in his 24-foot aluminum boat, passing the rotting pilings of old salmon canneries, one of which used to employ his father as chief electrician.

As we moved into the river, Fick said,



"I worked in a cannery and made plenty of money, enough to go to college. And there were a hundred guys like me in Astoria. You just don't make that kind of money working at McDonald's. There were so many opportunities here, a chance to choose your own path in life. And that's all been taken away from us."

Working as a commercial fisherman in the mid-1980s, he experienced the last big catches on the river, when the harvest—for four brief years—was ten times what it is today.

We talked as he payed out 500 yards of nylon net from a five-foot-high aluminum spool. "My primary income is from fish processing, but I'm an old dog with bad habits, and I still fish," he told me. "Fishing is not just a buck for us. It's a way of life. This is a very important part of our culture."

As he hauled in his net—a yield of about 110 pounds of salmon and 75 pounds of white sturgeon worth \$300—Fick said that he and other fishermen were not targeting main-stem Columbia dams. But he described the four lower Snake dams as a "boondoggle," projects that were built almost as an afterthought to create, at great expense, a port that is the farthest inland on America's West Coast.

"People shouldn't expect to have a seaport 500 miles inland," said Fick, who faces severe restrictions on catching some species in order not to catch endangered Snake River salmon incidentally. "From an economic standpoint those dams just don't make a lot of sense."

The greatest benefit to the Pacific Northwest, he said, would come if the Snake dams were breached, workers and farmers compensated, and Idaho salmon given a chance



**Broadening as it
nears the sea, the
great river of the
West, once thought
to offer endless fur,
fish, hydropower,
and irrigation water,
now offers hard
choices. Its power
fuels an empire. The
ultimate cost may be
the loss of a once
rich culture and its
signature species.**

Polarization

**A recent poll
by Boise State
University asked
Idahoans how
they felt about
breaching four
lower Snake River
dams to save
salmon runs.**

**Forty percent
favored
breaching.
Forty percent
preferred the
status quo.
Twenty percent
were undecided.**

to rebound. When I asked if he was sure dams were the chief culprit in the downward spiral of Columbia and Snake River salmon, he replied, "Why did fishing not really go down until you started throwing chunks of concrete in the river? Tell me that."

SO MANY PEOPLE have staked claims on the Columbia that managing it seems to be a zero-sum game: Steve Fick's gain would be the barge captain's loss. The government stewards of the river continue to referee the conflict, with federal officials saying they intend to study the salmon

problem at least three more years. They say they will continue trying to make the engineered river more hospitable to fish before recommending to Congress whether the four Snake dams should be breached.

The good news is that, given a chance, salmon are resilient. Witness the wild chinook of the Hanford Reach, which need only a small stretch of free-flowing river to thrive—and this despite the four lower Columbia dams they still must cross. The Hanford Reach is proof that the best thing man can do for salmon is to provide them with something resembling a naturally flowing river. But breaching main-stem Columbia dams, which provide flood control, irrigation, and large amounts of electricity, seems folly.

What, then, can be done for the Columbia River's salmon? Federal and state agencies can continue to improve the ways salmon get past the dams. They can continue to protect salmon habitat by controlling streamside development and refining farming and forestry practices. They can further reduce the already restrictive commercial and recreational fishing harvests. They can overhaul hatchery operations and better control predators. And then there is the measure whose concept is so simple but whose realization is the most daunting of all: breaching the four dams on the lower Snake River.

In the end, as it always does on the Columbia, the debate comes back to the dams, and in the murk of studies and counterstudies, claims and counterclaims, basic truths are sometimes obscured. One was articulated last year by Governor John Kitzhaber of Oregon, the only high-ranking elected official in the Pacific Northwest to support breaching the Snake dams.

"Some will say that we have not done enough science," Kitzhaber told the American Fisheries Society. "I say that we can always play that card as an excuse for inaction and as a justification for avoiding tough choices. But exactly what additional scientific experiment is necessary to demonstrate that it is easier for salmon to migrate in a free-flowing river than to negotiate a several-hundred-foot-high concrete barrier?" □

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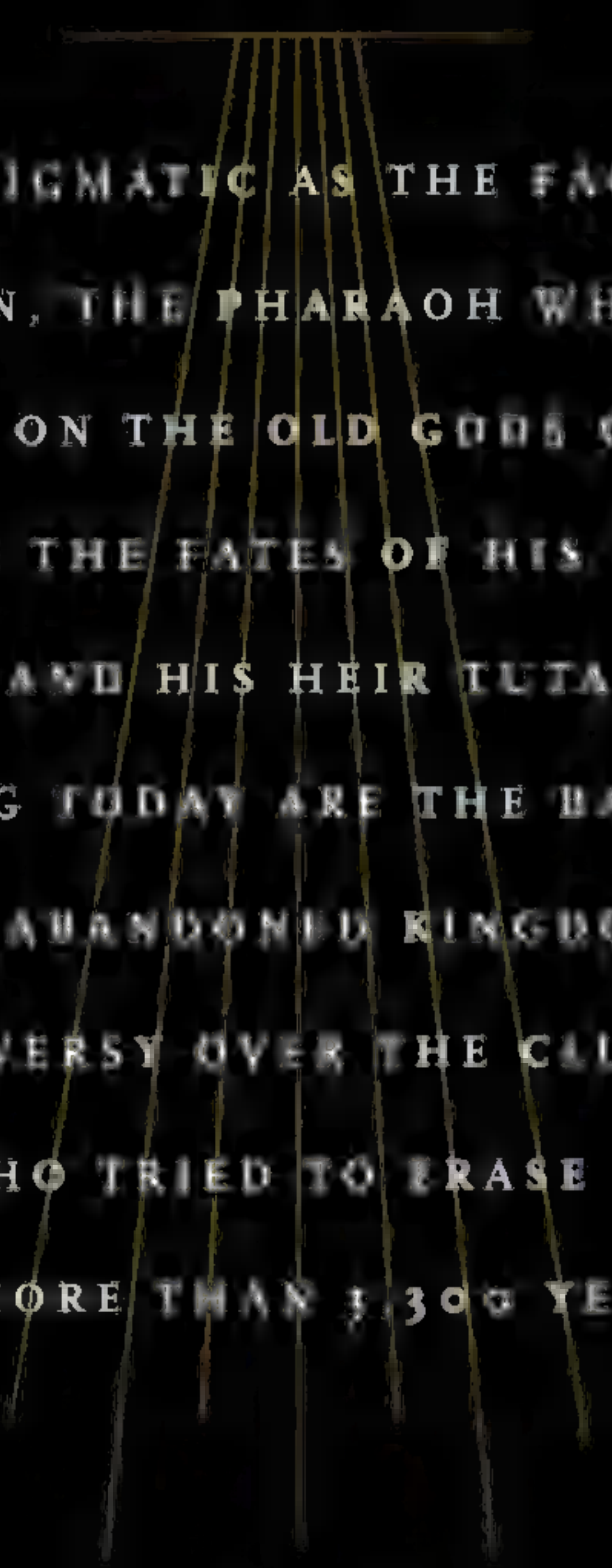
Should dams be breached to save salmon? Compare views and hear an interview with photographer Jim Richardson at nationalgeographic.com/ngm/0104.

P H I A R

O F T H E

MUSEUM.

A O O H S



AS ENIGMATIC AS THE FACE OF
AKHENATEN, THE PHARAOH WHO TURNED
HIS BACK ON THE OLD GODS OF EGYPT,
WERE THE FATES OF HIS WIFE
NEFERTITI AND HIS HEIR TUTANKEHAMUN.
REMAINING TODAY ARE THE BARE BONES
OF HIS ABANDONED KINGDOM AND
CONTROVERSY OVER THE CLUES LEFT
BY THOSE WHO TRIED TO ERASE A HERETIC'S
LEGACY MORE THAN 3,300 YEARS AGO.

BY RICK GORE

ILLUSTRATIONS

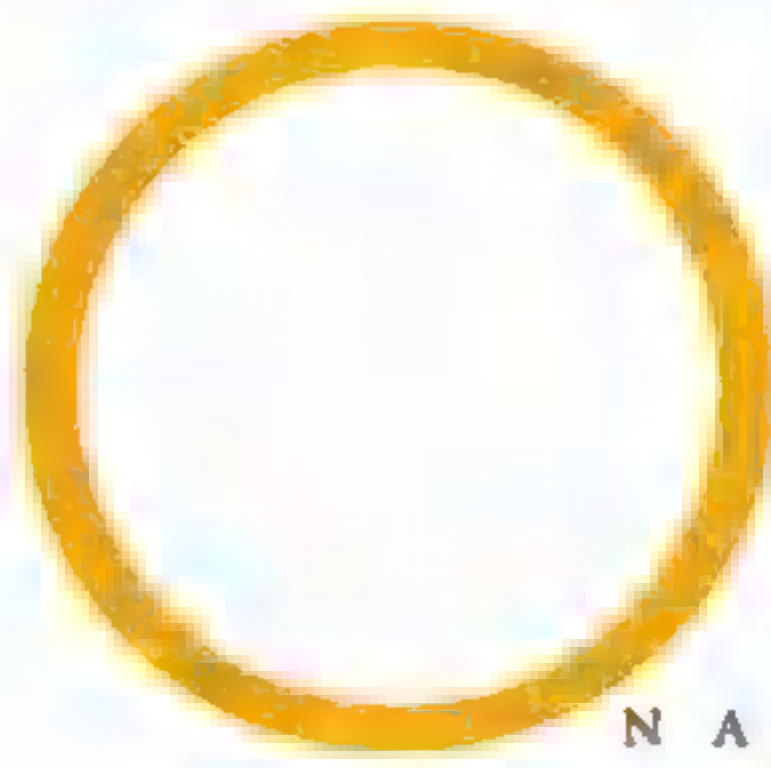
PHOTOGRAPHS BY KENNETH GARRETT

S U N



The royal Akhenaten, left, and Nefertiti revel in the attention of their daughters and the rays of their son god Aten. The scene's intimacy and portrayal of the pair as part of a life-giving triad with their god embodied the king's new religious and artistic vision.





IN A MORNING IN THE YEAR 1353 B.C.

a young pharaoh of Egypt rose before dawn to greet the sun with a poem he loved and perhaps had written: “Beautifully you appear from the horizon of heaven,” he prayed as sunlight began to flood Egypt’s capital city of Thebes. To him the rays of the sun were the embodiment of an ancient god named Aten, whom he passionately revered. “Oh living Aten, who initiates life. . . . Oh sole god, without another beside him! You create the Earth according to your wish. . . . You are in my heart, and there is none who knows you except your son.”

This was no ordinary morning for the king—nor for ancient Egypt. Pharaoh Amenhotep III had died, and this teenage son now had the power to elevate Aten above all the other gods in Egypt’s pantheon, even above the all-powerful Amun, who for hundreds of years had ruled in Thebes as king of the gods.

Soon this enigmatic young man would change his name to Akhenaten, “he who is effective for Aten.” With his queen, the fabled Nefertiti, he would plunge Egypt into a religious revolution that shattered centuries of tradition. He would elevate Nefertiti to divine status, giving her more influence than perhaps any other queen had known. And he would abandon Thebes to build a huge new capital, today known as Amarna.

Akhenaten, Nefertiti, and the boy pharaoh Tutankhamun—perhaps Akhenaten’s son born to a secondary wife—have been called the Pharaohs of the Sun. Their reign was brief. Akhenaten ruled just 17 years, and within a few years after his death in 1336 B.C., the old orthodoxy was restored. Akhenaten’s enemies soon smashed his statues, dismantled his temples, and set out to expunge all memory of him and Nefertiti from Egypt’s historical record.

SACRED GROUND “I shall make Akhetaten for the Aten, my father, in this place,” declared the king in 1348 B.C. of the land along the Nile where his new capital would spread. Today, guards escort tourists up cliffs for an overview of the city now known as Amarna.

But the controversy the couple created lives on. Egyptologists still struggle to piece together the story of this renegade pair. Swept up in religious passion, they brought the vast and powerful Egyptian empire to the brink of collapse.

“You’re never going to find two Egyptologists who agree on this period,” said Nicholas Reeves, a British Egyptologist.

Barry Kemp, an archaeologist at Cambridge University, is even more pessimistic: “The



minute you begin to write about those people you begin to write fiction.”

The same may be true of the likenesses left of them. Some of the finest ever made of Akhenaten and Nefertiti, excavated by German archaeologists between 1911 and 1914, reside in the Egyptian Museum in Berlin.

“See, she is as beautiful as ever,” says Rolf Krauss, a curator, as we enter a room dedicated to a painted bust of Nefertiti recognizable the world over. Spotlights in the darkened room set the queen’s long, graceful neck, flawlessly symmetrical face, and tall blue crown aglow.

Krauss and others debate whether Nefertiti actually looked like this bust—some think that it served mainly as a model for artists making other statues of the queen. But Nefertiti seldom looks the same in any of the numerous portraits of her. Krauss shows me one statue of her as an older woman (page 52). The face is lined, and the breasts

sag. “We call this the ‘tired Nefertiti,’ ” he says.

In the Egyptian Museum in Cairo are colossal statues—troubling and mesmerizing—of Akhenaten. His face is elongated and angular with a long chin. His eyes are mystical and brooding. His lips are huge and fleshy. Although he wears a pharaoh’s headdress and holds the traditional symbols of kingship, the crook and flail, across his chest, the chest is spindly, and the torso flows into a voluptuous belly and enormous feminine hips.

Because of the strangeness of these and so many other images of Akhenaten, scholars speculated for decades that the pharaoh had a deforming disease. But now many believe that the seeming bisexuality of the colossi might be rooted in Akhenaten’s new religion, for Aten had both male and female aspects. They also point out that in the early years of his reign, when Akhenaten was a young radical fighting an established religion, he had reasons



for the exaggeration. He wanted to break down more than a thousand years of artistic tradition, so he instructed his artists to portray the world as it really was.

Instead of the standard static depictions of physically perfect pharaohs smiting enemies or making offerings to the gods, artists gave the new king a much more realistic appearance. "Akhenaten probably didn't have the greatest physique by American standards," says James Allen, a specialist on the period at the Metropolitan Museum of Art in New York. "He had the easy life in the palace."

For the first time, artists routinely portrayed the pharaoh in informal situations—being affectionate with Nefertiti or playing with his children. They also painted scenes of life and nature—wheat rippling in the wind, farmers plowing, birds taking flight. In truth, Akhenaten unleashed a creative furor that gave rise to perhaps the finest era of Egyptian art.

YOU COULD COMPARE HIM to a cult leader," says Rita Freed, an Egyptologist from the Boston Museum of Fine Arts. Experts continue to argue whether he was the world's first monotheist. He insisted on one supreme god—an all-powerful creator who manifested himself in the sunlight. But he perceived himself and Nefertiti as extensions of that god—also deserving of worship.

Akhenaten's rebellion began with his father, the strong-willed pharaoh Amenhotep III, who ruled for 37 years during a golden age of Egyptian empire. Amenhotep III tapped the wealth of that empire to build an unprecedented series of monuments. These included elaborate constructions at Karnak and Luxor, religious centers of the god Amun, patron of Thebes.

Amun became increasingly powerful after Thebes regained control of Egypt around 1520 B.C. His name means Hidden One, and he resided in the inner sanctum of his temple at Karnak, where his priests fed, washed, and clothed a statue of him. Amun soon merged with the ancient sun god Re and became Amun-Re. Pharaoh himself was regarded as the son of Amun-Re. His divine authority could be renewed only by the Hidden One each year in a festival called Opet.

Late in his reign, and perhaps chafing from political friction with the priests of Amun,

Amenhotep III decided that he was not only the son of Amun but also the incarnation of Re—and thus at least equal to Amun. He began building monuments to his own divinity, including a vast funerary temple across the Nile from Thebes. This temple featured two 65-foot-high, 720-ton quartzite statues of himself that he declared should gleam into people's eyes like the rising Aten. The ruins of those statues are famed as the Colossi of Memnon.

The stage was thus set for the entrance of Akhenaten, who came to the throne as Amenhotep IV. Some scholars argue that Akhenaten and his father ruled together as co-regents for several years. Ray Johnson, a specialist at the



University of Chicago, believes the father lived on for many years, yielding power to his son and accompanying him to Amarna. But most now contend that Akhenaten ruled without his father, perhaps driven to outdo him.

Akhenaten was probably already married to Nefertiti when he ascended the throne. Perhaps both were children when they wed, as Akhenaten's father and mother, Queen Tiye, had been. No one knows where Nefertiti came from. Her name means "the beautiful one has come," which once led scholars to assume she was foreign-born. Today many believe she was from a town now called Akhmim and belonged to the same influential family as Queen Tiye. Wherever Nefertiti was born, she was a part of Akhenaten's revolution from the beginning.

"This is where he started," says Rita Freed as

Akhenaten's beloved sun sheds early morning light on Amarna ruins (right) — mud brick foundations and a tall, a simple column. Vivid facets in the priest Mentuhotep's tomb (below) detail city architecture, Egypt events, and the pharaoh's role — his subjects' link to the holy Aten.



TRACING A GLORIOUS PAST



AKHENATEN
(AMENHOTEP IV)

May
Upper and
Lower Egypt

Built the Great
Pyramid at Giza

MENTUHOTEP III
Reunified Egypt

TUTANKHAMUN
RAMSES THE GREAT

DARIUS I
Persian ruler,
codified
Egyptian law

**ALEXANDER
THE GREAT**

CLEOPATRA





HISTORY ERASED "Nefertiti's cartouche was chiseled from this stone, as Akhenaten's was elsewhere," says archaeologist Barry Kemp (above), "perhaps to make the temple more palatable to the new regime." Walls of 75-pound blocks—here depicting scribes assessing bread stocks (right)—were razed and reused by later kings. "The blocks' size made it easy to put buildings up but also easy to tear them down."

THE BUILDERS CUT BLOCKS LIGHT

we stand outside the towering gates, or pylons, of Karnak, which sprawls across some 250 acres near the modern city of Luxor. The sun beats down on us as once it did on Akhenaten, an inescapable force that infuses the bricks and walls and statues and enervates the throngs of visitors who trudge between the pylons.

"By the time Akhenaten came to the throne, this was the greatest shrine in the land," Freed says, explaining that each pharaoh was obliged to make an addition to the Karnak complex.

We walk to a 40-foot-high relief Akhenaten had carved on a wall of Amun-Re's temple soon after taking power. It's a traditional "smiting scene" for pharaohs. Akhenaten holds his enemies by their hair and is about to kill them.

"This was a major project," says Freed. "But it's unfinished. At some point Akhenaten said, 'Hold everything.'"

"His was a strange new vision," says Robert Vergnien of the University of Bordeaux in France. "Since the Egyptians' god was now the sunlight, they didn't need statues in dark inner sanctums. So they built temples without

roofs and performed their rituals directly under the sun."

"For a short time the Egyptians believed the sun god had come back to Earth in the form of the royal family," says Ray Johnson. "There was a collective excitement that becomes tangible in the art and architecture. The whole country was in jubilee. It's one of the most astonishing periods in world history."

But no one can say how broad Akhenaten's popular support actually was. Some scholars, including Sigmund Freud, have suggested Akhenaten was a visionary, a prophet whose form of monotheism somehow inspired Moses, who lived a century later. Others, such as Rolf Krauss, scoff at that. "He was a horrible tyrant who happened to have very good taste in art," says Krauss.

Whether by faith or force Akhenaten turned Thebes upside down in his first four years as king, building four new temples to Aten around Amun's temple at Karnak. Some believe that he may have been trying to merge the two gods into one.



LUXOR MUSEUM

ENOUGH FOR ONE PERSON TO CARRY.

To build great edifices quickly, Akhenaten's engineers invented a new construction technique. Because the Aten temples had no roofs, their walls did not need to be as sturdy as before. Instead of hauling huge pieces of stone, the builders cut blocks light enough for one person to carry. Excavation workers in the early 20th century named these blocks—roughly 20 inches long by 10 inches wide and high—*talatat*, after *talata*, the Arabic word for three. Each *talatat* measured about three hands in length. Ancient stoneworkers used the *talatat* like bricks to build Akhenaten's immense, open-air structures. Many bore colorful painted scenes from the lives of Akhenaten and Nefertiti. Other *talatat* bore images of everyday life in Egypt—ordinary Egyptians feeding a cow, baking bread, making beer.

The cut blocks first came to light in the 1840s. Scattered here and there at Karnak, they gave Egyptologists some of the earliest clues to Akhenaten's existence, so thoroughly had he been exorcised from ancient historical records.

The new pharaoh had enemies from the

start—despite the excitement that surrounded him. Akhenaten spent lavishly on his early monuments to Aten and taxed Amun's temples as he demoted the former king of the gods. By the fourth year of his reign tension was high. A turning point came in year five.

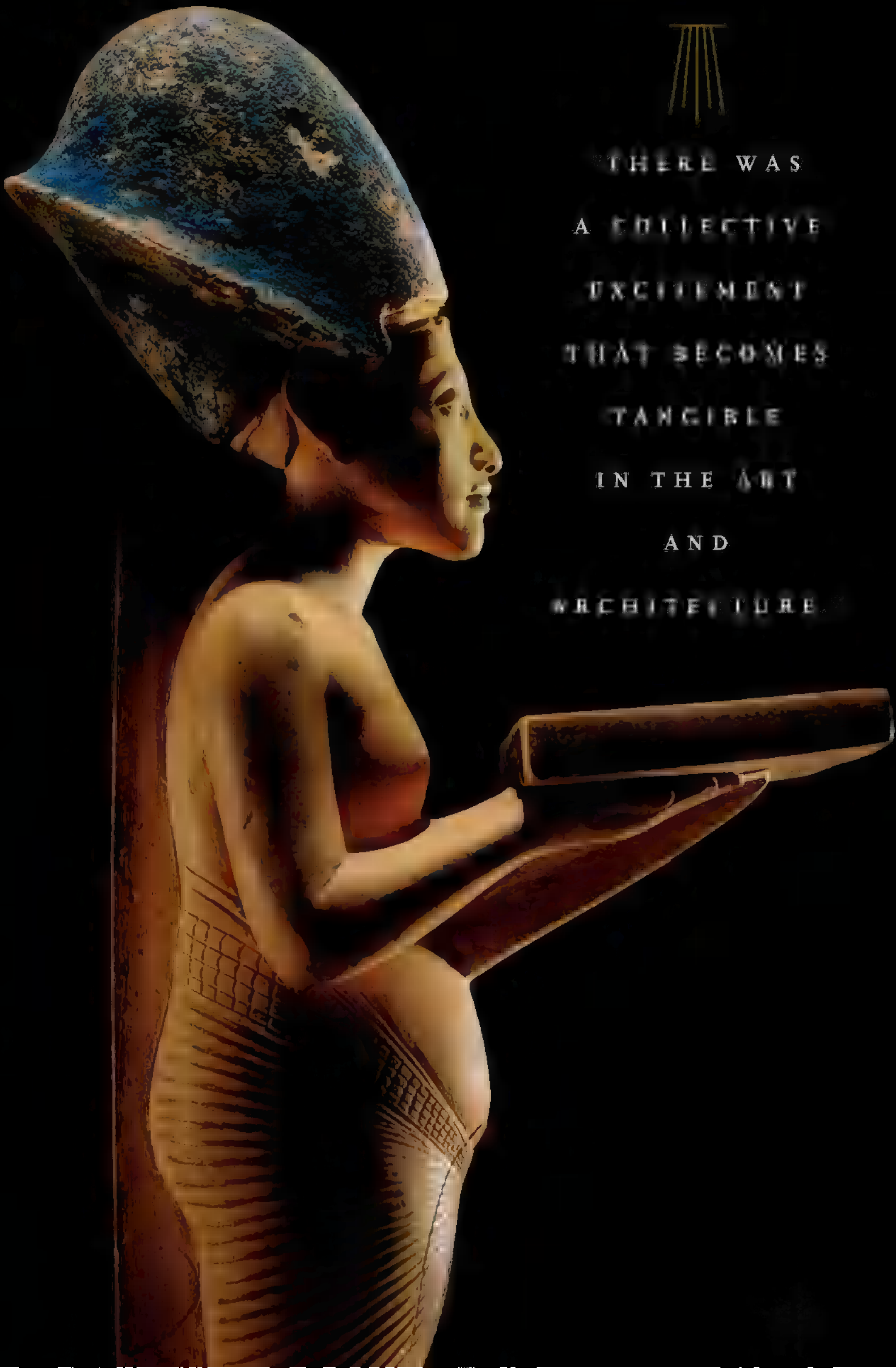
"Akhenaten can't bring himself to say what actually occurred, but it really ticked him off," says Bill Murnane, an Amarna specialist at the University of Memphis. "He rants about 'it' in an inscription at Amarna, saying 'it' was worse than anything he or his ancestors had experienced.

"I think the priests were fed up. They got together and drew a line in the sand. So he picked up his marbles and abandoned Thebes."

The site Akhenaten chose for his new capital lay 180 miles to the north on the eastern bank of the Nile, sheltered by a ring of steep limestone cliffs in a desert valley. He had visited the place once, and the sun rising above the cliffs must have moved the young king. He named his new capital Akhetaten, meaning "horizon of Aten." On decrees carved into stelae there,



THERE WAS
A COLLECTIVE
EXCITEMENT
THAT BECOMES
TANGIBLE
IN THE ART
AND
ARCHITECTURE





TREASURES OF AMARNA



He abandoned much of what his predecessors had built, but Akhenaten left behind a legacy of wealth and art. "He wasn't a religious fanatic who renounced luxury and ran off into the desert," says Ann Russmann of the Brooklyn Museum of Art. "His was clearly a very luxurious court." Wealth's rewards (above): a glass fish vessel, a lotus-shaped chalice, and ornate glass jars.



WITHIN A YEAR OR TWO A HUGE NEW

the king tells how Aten revealed this desolate land to him and told him it was the place where the creation of the world occurred. Within a year or two a huge new city with 20,000 or more residents sprouted along the river.

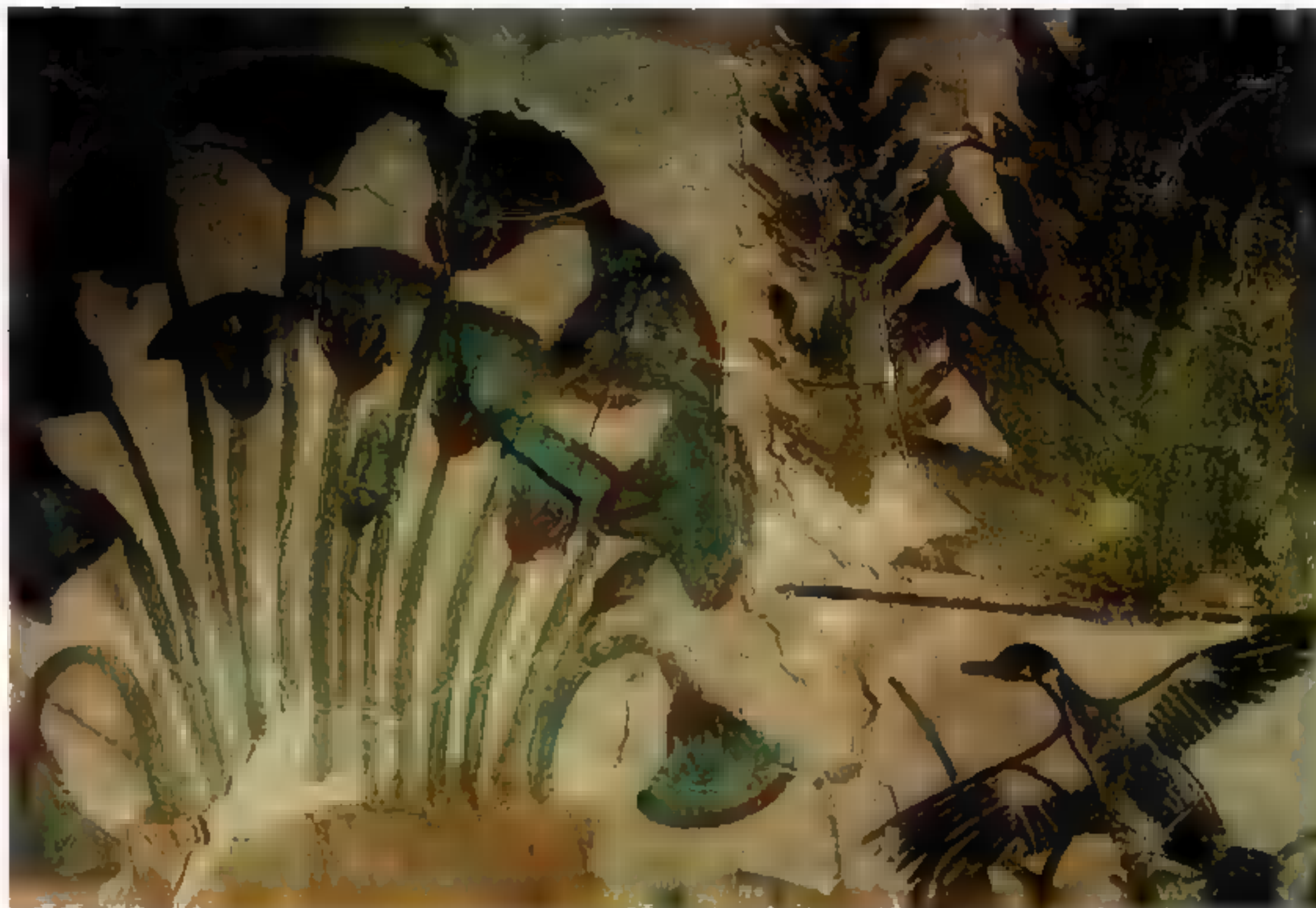
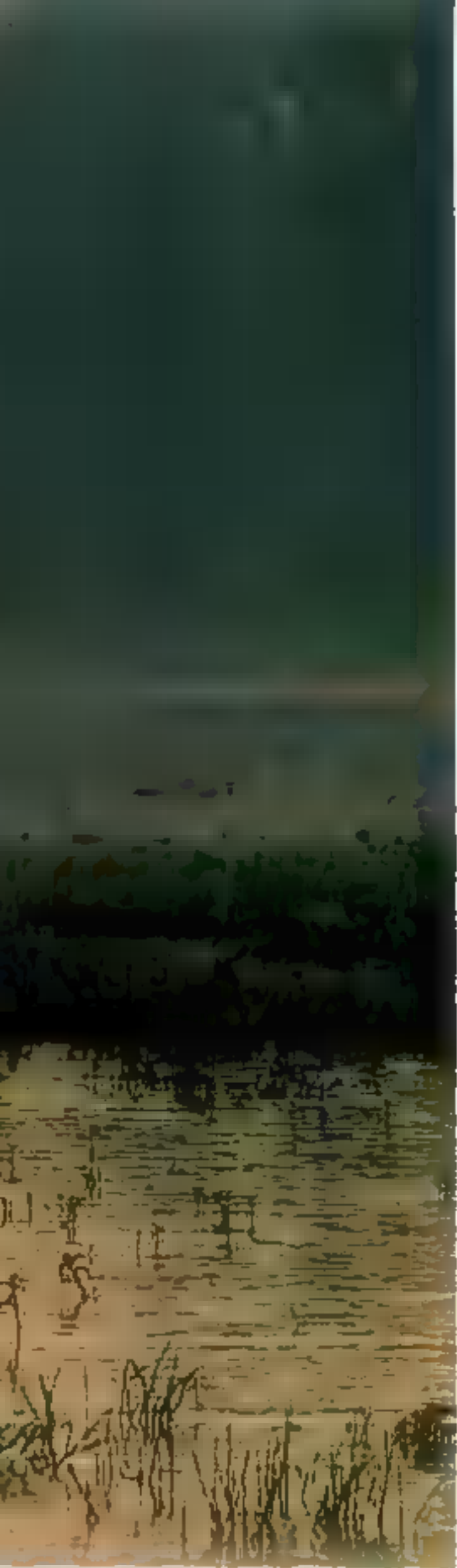
Today archaeologists call the area Amarna, after a modern village nearby. Despite the name change, sailing to Amarna remains a voyage into a realm of religious fervor. The site lies in a region where Islamic fundamentalists have waged terrorist warfare against Egypt's government, sometimes attacking tourists. I traveled there with a group organized by the Boston Museum of Fine Arts. We were escorted by two tanks and stern-faced soldiers with automatic rifles. When we pushed off from the river's west bank in a ferry that would take us to the ruins, a police boat with sailors manning machine guns preceded us.

But at Amarna all was peaceful, the shore lined with date palms and mud-brick homes, many of them whitewashed and decorated with paints of many colors. A sign bearing stylized heads of Nefertiti and Akhenaten

greeted us at the dock. "Welcome," it read. "Civilization started here."

Amarna does not overwhelm with dramatic monuments as Karnak does. "After the Amarna period was over, gangs of workmen were sent to remove and reuse the stone," says Barry Kemp, who has worked the site since 1977. But in its prime Amarna stretched for about eight miles along the Nile and as much as three miles inland. A wide road ran parallel to the river, leading to the temples and palaces of the king. The royal family paraded down this road in chariots en route to rituals. The most spectacular of the temples was 2,500 feet long and 950 feet wide. Its vast, open courtyard was filled with offering tables and lined with statues of the king.

Amarna has been called the Pompeii of Egypt. Its monuments and houses are gone, but the foundations are largely intact. No one built new structures over its ruins, as in most ancient cities. So Amarna offers a time capsule look at how ancient Egyptians laid out their cities during the New Kingdom. "It's



EGYPTIAN MUSEUM, CAIRO

WILD PRAISE Birds took flight and flowers bloomed beneath royal feet in one of Akhenaten's Amarna palaces, where painted floors honored the natural world (above). "All of nature was created and nourished by the Aten," says Amarna specialist Bill Murnane. "Simply being alive was an act of worship." The Nile's bounties were also gifts from Aten, and fishermen then, as now (left), took from its teeming waters.

CITY SPROUTED ALONG THE RIVER.

the only place you can go and walk the streets of an ancient Egyptian city," says Michael Mallinson, an architect working with the Egypt Exploration Society.

Barry Kemp's research team has spent more than two decades exploring the economic life of the town. By painstakingly sifting through the sand and recovering potsherds, pieces of glass, resins, pollen, hog bristles, and insect remains, they have learned much about day-to-day life. They have located districts where textiles and glassware were made, where cattle were penned and hogs butchered. They have determined which incenses were burned and what fish were caught—even which beetles crawled through the grain the residents stored and used. Termites may have been a severe problem, undermining the timbers that held up many structures.

One of the most important finds at Amarna was a collection of about 350 diplomatic letters written on clay tablets, discovered around 1887 by peasants digging in the ruins of a building known as the House of

Correspondence of Pharaoh. These so-called Amarna Letters give a nearly complete record of correspondence between Egypt's court and various rulers of western Asia.

One of the most notable writers was Tush-ratta, king of the Mesopotamian state of Mitanni, a vital ally that regularly sent royal daughters to the pharaoh's harem. A mysterious secondary wife of Akhenaten named Kiya may have been one of those daughters. Little is known about Kiya except that she earned the title Greatly Beloved. The pharaoh may have built a large building, known as the North Palace, to honor her. Some scholars believe she achieved such prominence because she gave birth to a male heir—Tut. Nefertiti, as far as we know, bore only daughters (although the pharaohs customarily did not mention their possible male successors).

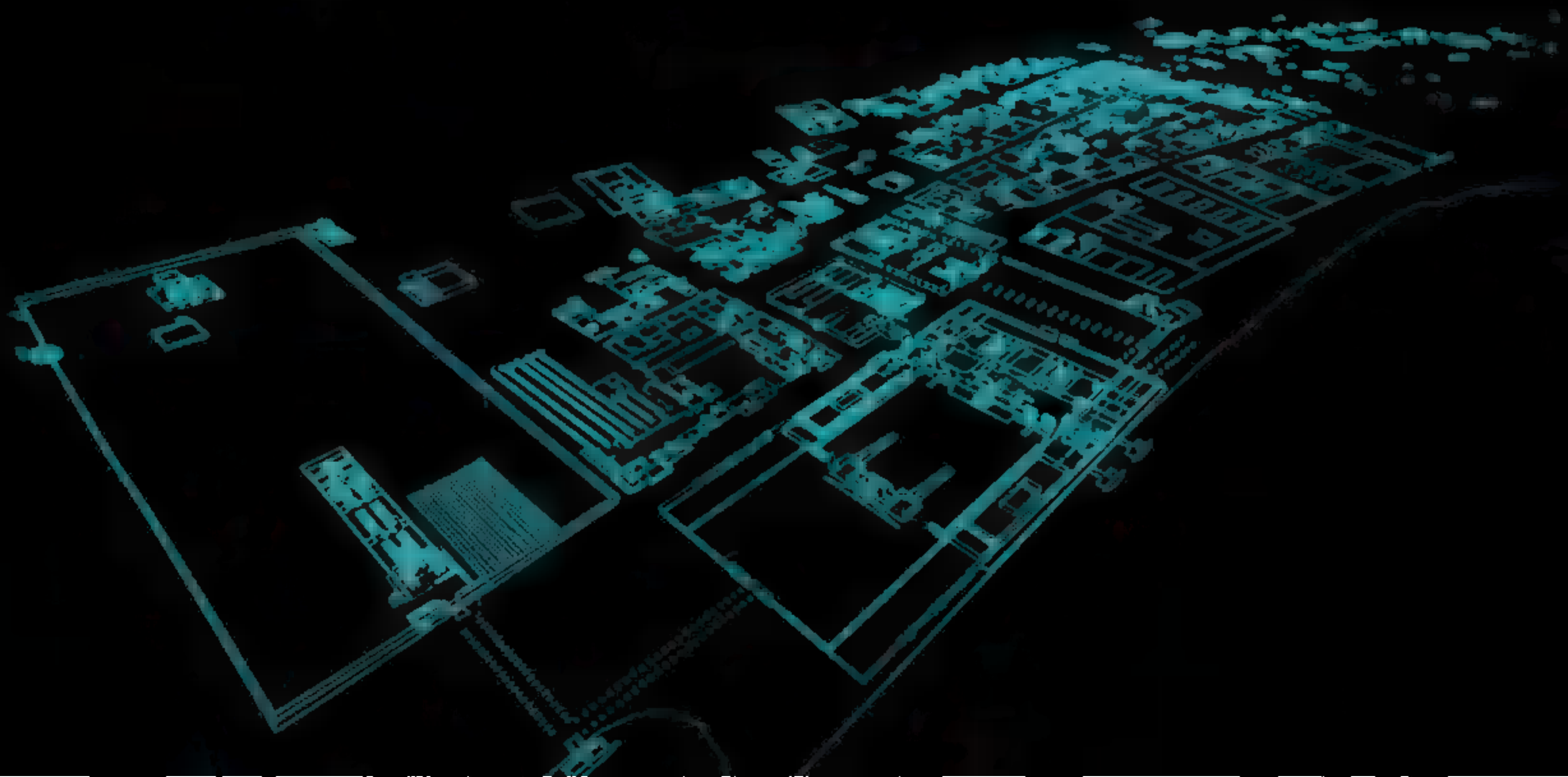
Kiya disappears around year 12 of Akhenaten's reign, and the name of Akhenaten's oldest daughter, Meritaten, is inscribed over Kiya's on stone fragments found at the North Palace. Kiya may have stolen (Continued on page 53)

Views of ancient Amarna are derived from 40 years of excavation and research. "We know digital artists visited regularly with families for the king," says Barry Kemp. In a computer-generated scene at the Great Palace, citizens gather at the jet to collect water, and ride the ferry, while officials wait for an ambassador's boat to dock. "The focus of diplomacy and economics was the river, where messages and deliveries came from all over the empire," says Kemp. Tomb art shows arrivals by boat not only of dignitaries but also of cattle, grain, and stone that were then stored in facilities south of the palace.



AMARNA

AN ANCIENT CITY COMES TO LIFE





ART BY MICHAEL MALLINSON AND ADAM HOWARD, REDVISION/SITE; MODELS PHOTOGRAPHED BY ROBERT CLARK



SOURCE FOR IMAGES: BARRY KEMP AND JAMES SPENCE, EGYPTIAN CIVILIZATION SOCIETY; COMPUTER MODEL BY MICHAEL MALLINSON

Archaeologists, architects, and computers joined forces to rebuild Amarna in detail. A computer model (left) renders the city's outline. Closer in, the Great Aten Temple (far left) in red at the water's edge and Small Aten Temple (left) in red are seen. Zoom in for detailed family scenes (above right and following pages). "The model lets you walk the city, see the granaries and cattle pens, and enter the houses and tombs," says architect Michael Mallinson,



In a recreation of a tale from a tomb carving, Akhenaten's mother, Tiye, at far left, visits the royal couple, holding hands, at Amarna shortly before her death. The solar court of the Small Aten Temple, with its massive columns and being open to Aten's rays, is true to the



ART BY MICHAEL MALLINSON AND ADAM HOWARD, COSTUME DESIGNER: ROBERT CLARK, HAIR: BARRY KOFF AND MAKEUP: LORIE SPENCE

archaeological record. Priests and princesses brought offerings to the royals, whose whimsical designs were taken from art preserved in tombs. "We're used to the ornate costumes we see in movies," says Carrisi, "But they didn't really dress like they do in Hollywood."



DID
NEFERTITI
SURVIVE
AND
RULE
BRIEFLY
AS
PHARAOH?

(Continued from page 47) Akhenaten's affections and been done away with by a jealous Nefertiti. After Kiya disappears, Nefertiti rises to new power, perhaps as Akhenaten's co-regent.

In one Amarna letter, written to Akhenaten's mother, Tiye, the Mitannian king complains that Akhenaten has not sent gifts that his father had promised: "I had asked your husband for statues of solid cast gold. . . . But now . . . your son has [sent me] plated statues of wood. With gold being dirt in your son's country, why have they been a source of such distress to your son that he has not given them to me? . . . Is this love?"

Why did Tushratta write to Tiye instead of to the pharaoh himself? Perhaps Akhenaten was so preoccupied with religion that he was neglecting foreign affairs. Tushratta's pleas were not always greedy; in fact they gradually became desperate. Mitanni was besieged by the Hittites, who threatened Egypt's empire in the north. Toward the end of his reign Akhenaten sent troops, but his response came too late. Tushratta was overthrown and murdered by his own son.

Meanwhile Akhenaten faced growing unrest at home. Around year nine of his reign the priests of Amun must have provoked him further. In a rage Akhenaten closed Amun's temples, and all over Egypt the name and image of the former king of the gods was hacked out of tombs and monuments.

Around year 12, about the same time Kiya disappeared, Akhenaten's second daughter,

Meketaten, died. Queen Tiye, two other daughters, and perhaps even Nefertiti died in the next few years. All those deaths in such a short time suggest to some scholars that Egypt was racked by plague, an affliction Akhenaten's enemies could have used to fire political dissent, saying the gods were angry at this heretic pharaoh.

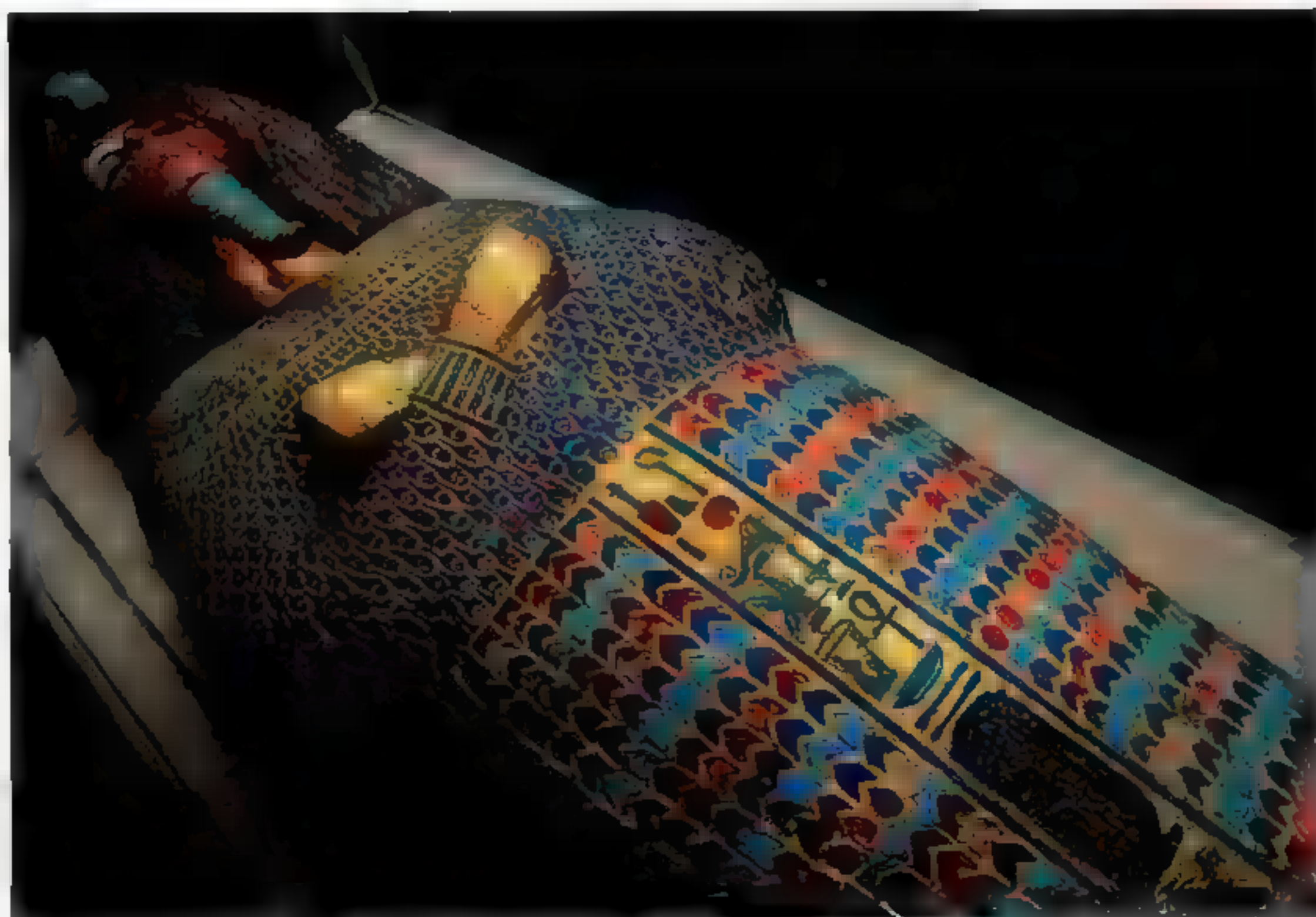
On the military front the Hittites were toppling Egypt's allies. In the midst of growing chaos Akhenaten died. No one knows when or how, but inscriptions indicate that his 17th year as king was his last. He was buried in a lavish tomb cut into the cliffs east of Amarna.

THE YEARS FOLLOWING Akhenaten's death provoke enormous argument. The debate is confused by the Egyptian tradition of giving pharaohs a throne name and a personal name. Until recently scholars assumed that there was only one immediate successor, a pharaoh with the throne name of Ankhkheprure and the personal name Smenkhkare. He supposedly married Akhenaten's eldest daughter, Meritaten. Now some suspect there were actually two pharaohs with the throne name Ankhkheprure. The other pharaoh's personal name was Nefernefruaten, which is identical to a longer variation of Nefertiti's name. Did Nefertiti survive and rule briefly as pharaoh?

Whoever Nefernefruaten was, she was a woman, according to inscriptions recently

HER FINAL ACT?

Beneath the weight of years, Nefertiti's beauty grew tired (left), but her end remains a mystery. Did this queen die a pharaoh? Coffins like the one found in tomb KV 55 (right) in the Valley of the Kings—perhaps built for a king's wife but containing a male who some believe is Akhenaten—tantalize those seeking Nefertiti's remains.



EGYPTIAN SARCOPHAGUS, BERLIN (LEFT); EGYPTIAN MUSEUM, CAIRO

ROYAL LINE



AMENHOTEP III
1390 – 1353 B.C.

Akhenaten's parents had a wealthy and politically stable reign. Their first son died; their second took the throne.



TIYE



NEFERTITI



AKHENATEN
(AMENHOTEP IV)
1353 – 1336 B.C.

In his 17 years as pharaoh, the heretic Akhenaten (born Amenhotep) changed his name, abandoned Egypt's capital to build his own, and completely revamped art and religion. The unprecedentedly powerful Nefertiti was his principal wife, and Kiya his Greatly Beloved.



KIYA

AMENHOTEP III, LUXOR MUSEUM, TIYE, NEFERTITI, AND AKHENATEN, EGYPTIAN MUSEUM, CAIRO

identified by a young French scholar, Marc Gabolde of the University of Montpellier. Gabolde also thinks this female pharaoh made an audacious political move.

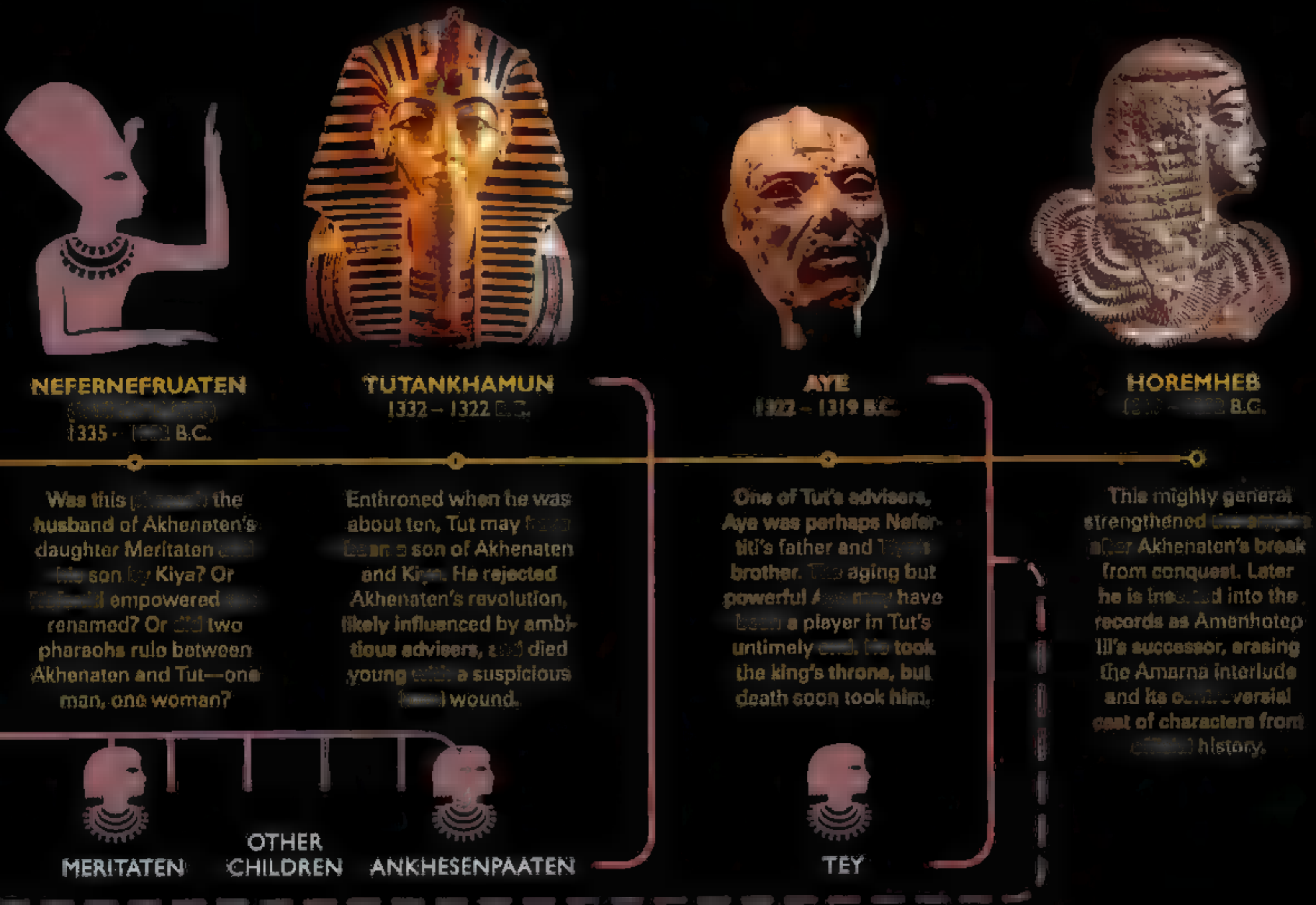
Archives found in the Hittite capital of Hattusa in Anatolia indicate an Egyptian queen of that era wrote a desperate letter to the Hittite king saying her husband had died and begging him to send her one of his sons so that she would not have to wed a "servant." The English scholar Nicholas Reeves argues that Nefertiti wrote that plea. Marc Gabolde believes it was her daughter Meritaten. Gabolde believes that the Hittite king sent his son Zannanza, who ruled briefly as Smenkhkare before dying.

Whoever the intermediate pharaohs were, Tut assumed power about four years after Akhenaten's death. Most scholars suspect he was about ten at the time and was guided by two men: the general Horemheb and a courtier named Aye, perhaps Nefertiti's father. Tut recognized Amun as the king of the gods and within two years moved the religious capital back to Thebes. Soon the names of Akhenaten and his god were eradicated and their temples torn down. Amarna was gradually abandoned.

Tut ruled for about ten years before he died in 1322 B.C. X-rays of his mummy have revealed a wound on his skull. Some scholars have suggested he was assassinated. Perhaps by the time he was in his late teens, Tut, like his father, was starting to have ideas of his own. His mentors could not tolerate another heretic. Aye succeeded Tut but died within three years in 1319. Horemheb followed Aye to the throne and ruled for 27 years, obliterating every record of Nefertiti and Akhenaten that he could.

What happened to the royal family after Akhenaten's death continues to inspire serious archaeological dispute. Nicholas Reeves believes that Tut brought all the royal mummies from Amarna back to the Valley of the Kings, which lies across the Nile from Thebes, to be reburied. In the transfer it seems that Tut managed to confiscate some of their lavish funeral equipment for his own tomb. He was buried in a coffin that may have been originally intended for Nefertiti.

Reeves argues that a mummy found in a tomb very close to Tut's own belongs to Akhenaten. The tomb was given the catalog name KV (Valley of the Kings) 55 early in the 20th



NEFERNEFRUATEN: NGM-ARI; TUTANKHAMUN AND AYE: EGYPTIAN MUSEUM; HOREMHEB: RIJKS MUSEUM VAN OUDHEDEN, LEIDEN

century. Other specialists strongly reject that claim, contending that the body was too young—only around 20 according to x-ray analysis. They believe the mummy in KV 55 was Smenkhkare, one of Akhenaten's successors before Tut. Yet Reeves is most interested in the whereabouts of another family member.

NEFERTITI IS MISSING," the archaeologist says, his eyes gleaming with the appetite of a detective tackling a complex murder mystery. We are peering down a 20-foot-deep shaft that leads into another ancient tomb—KV 56—across the valley from

THE SUN SETS
 Built largely by the father and abandoned by the son, Luxor Temple (ruins at right) was Amenhotep III's dedication to the sun god-creator Amun-Re and to himself as Amun's progeny. Akhenaten's rejection of Amun left his father's legacy neglected and defaced. Later kings expanded the temple, reinstating the gods of old.





EGYPTIAN MUSEUM, CAIRO

SOLID CLUES Successors Tut (above, with queen) and Horemheb helped bury Akhenaten's memory, but workers at Horemheb's addition to the Amun-Re temple at Karnak (right) are rebuilding history. Thousands of blocks etched with Amarna's stories have been rescued, though the stories remain incomplete. Says Bill Murnane, "Ultimately, we are at the mercy of fragments."



SOON THE NAMES OF AKHENATEN

KV 55. The musty smell of the ages wafts from the dark tomb, which archaeologists discovered in 1908. About a dozen Egyptian workmen, some dressed in turbans and loose-fitting blue robes and others in baseball caps and T-shirts, dig with picks and hoes along the tourist path.

A principal goal of Reeves's excavation, named the Amarna Tombs Project, is to determine the ancient level of the Valley of the Kings—before centuries of flash floods washed in many feet of sediment. Reeves is also hoping to find some new clue to the whereabouts of Nefertiti, whose mummy has never been found. KV 56 was first opened 14 years before King Tut's tomb, but its discovery scarcely excited the world. Though the excavator, Edward Russell Ayrton, did find a cache of gold jewelry from a later dynasty,

grave robbers had thoroughly looted the tomb's original contents.

Although fueled by hope, archaeologists need evidence—and even a few scraps this season would make Reeves happy. Perhaps a fragment of a burial jar or an inscription etched into a tomb wall will prove Tut had Nefertiti reburied in KV 56. As I follow him down a ladder into the gloom of KV 56, Reeves tells me that the shaft itself gives a clue. The opening is surprisingly large—about 10 by 12 feet.

"I suspect they made it so big so they could get royal burial shrines down," he says.

A royal mummy was usually encased in a series of highly decorated wooden shrines, one inside the next. At least three of the gold-covered shrines found in Tut's tomb, the largest of which measured about 17



AND HIS GOD WERE ERADICATED.

feet long, 11 feet wide, and 9 feet high, were perhaps originally made for Akhenaten and Nefertiti.

The inside of KV 56 is underwhelming—just diggers sorting through sediments for artifacts. But to Reeves this tomb is beautiful. “The cutting of the walls was meticulously done—fit for a queen,” he says. He suspects that the chamber was intended to be much larger but was left incomplete. The far corner looks unfinished, and Reeves believes the stoneworkers had been planning to cut a central column for a much larger tomb. Central columns are typical features of queenly tombs.

Weeks later I meet Reeves in London, and he remains excited about his theory that KV 56 was Nefertiti’s tomb. But he cautions that there are other queens who could have qualified. Compelling evidence remains to be found.

“Nefertiti is still missing,” he says as we part.

His words linger later that night as I walk through London’s theater district. The marquee lights remind me how I got started on this quest. I first became interested in Nefertiti more than a dozen years ago. My late brother, a playwright, wrote a romantic musical about her that was mounted for Broadway in 1977. It never got there, closing in Chicago, but it left me wondering who this romantic woman really was. Was she the heroic spirit my brother portrayed? I had hoped the world’s leading experts would resolve that mystery for me, but as much as I have learned, she remains elusive. For me, too, Nefertiti is still missing. □

MORE WEBSITE

Read field tales from Rick Gore and Kenneth Garrett at nationalgeographic.com/ngm/0104.



Pursuing

the dream of a better life



the whale

Illustrated by [unreadable] & [unreadable]

By [unreadable] & [unreadable]



Off San Juan Island in Washington's Puget Sound, a fine mist brushes the little boat—and just as suddenly vanishes. The vapor looks like a loose wisp of rainbow and smells like overcooked broccoli. The skiff bounces on over Salmon Bank, where cold, nutrient-rich water wells up from the deep and forges a thick food chain. We head for a silver commotion of herring to starboard.

Salmon, dogfish sharks, or both might have forced this school of juveniles to the surface. The fish quickly drew sharp-eyed diving birds—rhinoceros auklets, guillemots, and cormorants—which forced the herring into a churning ball. A harbor seal rolling in the middle with its mouth open suddenly scoots off to one side. The birds take flight. The next instant a whale explodes upward through the ball, then sinks out of sight, leaving a ring of ripples with fish scales glinting in the center and, once again, the aroma of broccoli steamed beyond its time.

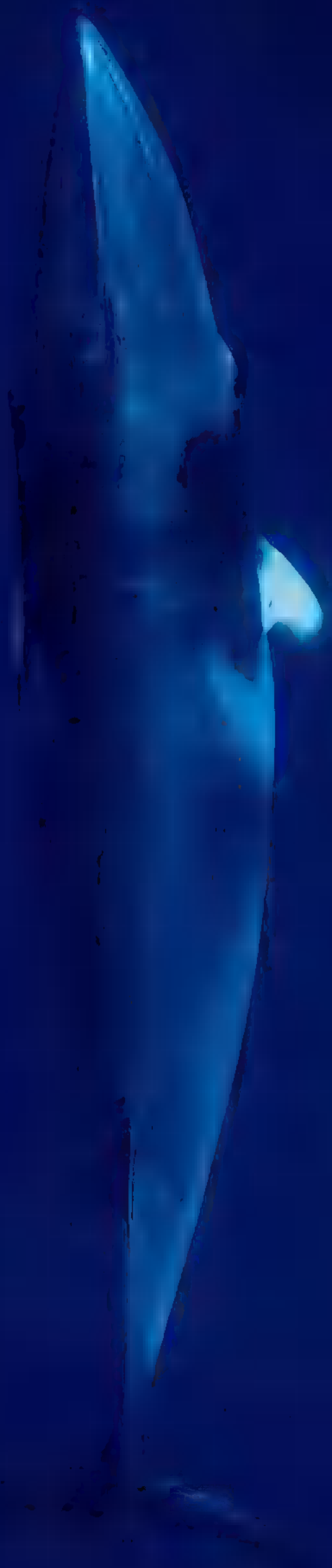
“That,” says Jonathan Stern, ■ Florida State University marine biologist, trying to steer while scribbling notes, “is minke whale breath.”

Also known as little piked whales and pikeheads, minkes are the smallest members of a family of baleen whales called rorquals. The group includes 120-ton blue whales and other titans such as humpbacks, seis, and fins. Minkes, 22 to 33 feet long with a weight of just 5 to 10 tons, seem downright svelte by comparison. Nevertheless, a 19th-century German sea captain named Meincke once confused a pikehead with a blue. (The naive Meincke, according to one version of the tale, was sailing aboard a Norwegian whaler in hopes of learning the business.) As a joke, the whalers took to calling the littlest rorquals Meincke whales, mispronounced minke (MINK-ee).

By the latter half of the 20th century unrestrained hunting had caused populations of many of the bigger rorquals and other great whales to collapse. Their plight seemed to symbolize the power of modern societies to overwhelm even the grandest life-forms and once boundless seas. In the 1970s “Save the Whales!” became a rallying cry for the awakening environmental movement. In 1986 the International Whaling Commission (IWC)—formed in 1946 to represent whaling nations, including the United States—issued a worldwide moratorium on commercial whaling.

Many people have since come to think of whales in general as highly imperiled. Some are. Others appear to be replenishing their numbers. Minkes, never seriously depleted, number close to a million, maybe more. Wandering every ocean, they are by far the most common baleen whale and probably the most abundant of all whales. Minkes are also the only whale still extensively hunted, by Norway and Japan.

After the IWC ban the Norwegians lodged a formal objection. They insist on exercising their sovereign right to whale in their own waters, where they harpoon between 400 and 600 minkes yearly. Under a provision of IWC rules the Japanese practice scientific whaling, most years killing more than 400 minkes in the high seas around Antarctica and 100 in the North Pacific. Japanese researchers say they need this number of carcasses to carry out genetic studies and to gauge rates of growth and reproduction. Stomach contents can reveal a minke's diet, for instance, while wax layers annually deposited in the ear show the animal's age.

A large, dark, pointed object, likely a whale's snout or tusk, set against a dark background. The object is elongated and tapers to a sharp point at the top. It has a rough, textured surface with some lighter-colored patches and a small, irregular opening near the top. The lighting is dramatic, highlighting the contours and texture of the object.

Missile black, minke whales can swim up to 20 miles an hour—faster than their larger cousins, blue whales, and faster than many whaling vessels. Their distinctive pointed snouts inspired a variety of common names, including pikehead and sharp-headed finner.

Why,
Norwegians
ask, do
countries like
the U.S.
tolerate
whaling by
natives but
criticize us?

But others disagree that killing whales is necessary. “Japan could get the same information by nonlethal studies,” says Karen Steuer of the International Fund for Animal Welfare, a political advocacy group. “Scientific whaling is commercial whaling in disguise.”

Japan and Norway have petitioned the IWC to lift the moratorium and legalize commercial minke hunting, a move supported by Iceland, Greenland, and others. They’ve also asked that restrictions on the export of whale products imposed by the Convention on International Trade in Endangered Species (CITES) be relaxed. As a result the minkes are at the center of a global debate over the human relationship with all whales.

Among the speediest whales, minkes have been clocked at 20 miles an hour. They seldom show themselves for long on the surface, and their spout is so low and diffuse you are often less likely to see a blow than to hear or smell it. Despite research based upon whalers’ catches, scientists still have much to learn about how the animals live.

They do know that minkes, like many whales, generally migrate from rich summer feeding grounds at high latitudes toward warmer waters to mate and give birth, but the precise location of the breeding grounds remains a mystery. Their summer haunts are better known. Some individuals not only return to the same general range year after year but will frequent particular sites within it. Focusing on three areas along the Pacific coast of the U.S. and Canada, Jon Stern and his colleagues have recorded one or another of 60 known minkes on 450 occasions. The tally includes an animal sighted 37 times over nine years in the San Juan Islands.

Not all minkes are so faithful to a seasonal spot. Many in the Southern Hemisphere roam Antarctic waters to seine krill. Northern Hemisphere minkes can also be found far offshore—in some cases eating swarms of microscopic copepods along the polar ice edge—but most appear to cruise the continental shelves. Zooming between patches of food within familiar areas, they may rely in part on seabirds, large fish, seals, sea lions, and even other whales to signal the whereabouts of prey and herd it into dinner-size helpings. At the same time this lithe whale is capable of chasing down a stout cod one-on-one. “The better minkes get to know a place over time,” Stern says, “the more efficiently they can use it.”

Off Scotland’s rocky shores, minkes cut the currents with spear-point noses. A broad white spot flashes from each flipper. Streaks of paler cream slant from the belly up the sleek sides like chevrons of foam. Not that Scottish whales are truly fairer than minkes elsewhere. It’s just that the water here toward the Isle of Coll is so transparent I can make out every detail of the swimmers’ forms.

The scrutiny works both ways. Alison Gill, a marine biologist who guides natural history tours, tells me that minkes will lift their heads from the water and eye her boat, as if trying to fathom the creatures leaning over the rails. “We often ask ourselves, Who’s watching who?”

Some citizens of the British Isles are unaware that any whales still ply the waters close by. But if they board the ferry between the northwestern village of Arisaig and the islands of Eigg, Rhum, and Muck, they might well find themselves subject to minke delays. Captain Ronnie Dyer of the *Shearwater* happens to be very fond of the beasts.



STEVE MORGAN, GREENPEACE

“They definitely come to check out the boat more often when we’re towing a dinghy,” he says. “Once we watched a minke jump for an hour and a half. When we see something great, the schedule goes right out the window. Hardly anyone minds. Minkes are big for people who have never seen a whale.”

“And how often do you get to hold a whale?” asks Linda Johnson, owner of a guesthouse on the Isle of Lewis who helped tend a minke stranded on the rocks. “The whale was 16 feet long but only a baby,” she recalled. “It was lovely and all soft and silky smooth. We had to wait for the tide before we could lift it free.

“Off it went until it was almost out of sight. Then it returned. We were worried it would go onto the shore. But it swam away, and we decided the animal just came back to say thanks and cheerio. That’s when we started to worry the poor thing might be going to Norway next.”

By the mid-1950s Scotland’s nearest continental neighbor, Norway, was killing an average of 3,500 minkes a year in the North Atlantic, before voluntarily cutting back to around 1,800 yearly until 1983. Meanwhile, in Antarctic waters the Soviets and Japanese intensified their hunt for minkes, claiming 65,000 just from 1971 to 1981, as larger whales grew scarce. After the moratorium, Norway ceased whaling in international waters but raised the annual take in its own waters from a token few to nearly 600 in 1999.

Why, Norwegians ask, do countries like the U.S. tolerate whaling by natives but criticize us? What about native Norsemen, whose culture has always been intimately bound to the sea? The old Norse name for the minke—*vågeval*, or bay whale—refers to this shore cruiser’s tendency to enter fjords and other inlets. From Viking times onward, fishermen would draw nets across a passage to block an animal’s escape and go after it with harpoons.

While a Norwegian Coast Guard vessel hovers nearby, a minke is hauled aboard a fishing boat in the North Sea—a scene recorded by antiwhaling activists. Vikings once hunted minkes with poison-laced arrows; now whalers use fast-killing grenade-tipped harpoons. Small boats work domestic waters despite a 15-year-old international whaling moratorium.

In the sprawling Tsukiji Market minkes show up as slabs of raw flesh, smoked wafers, salted bacon, and packets of crunchy cartilage.

Today the stronghold of Norway's oceangoing whaling industry is Lofoten Island, about a hundred miles north of the Arctic Circle. There, men from the Olavsens family have been whaling for generations, and they continue to net fish and hunt minkes today. Olav, the captain, invites me aboard their ship, the *Nybræna*, in the harbor near the village of Leknes. His younger brother, Jan Odin, and son, Leif Ole, lead me to the bow, where I come to grips with my first modern harpoon. Resting in the throat of a laser-sighted cannon, the lance carries a thermal grenade. Once the metal tip punches two feet into a minke, its charge of penthrite will burn at more than 5,000 degrees. It isn't the heat that kills; it's the shock waves from this stuff's supersonic rate of combustion.

On board is a veterinarian, Egil Øen, who shows me minke brains he has collected for autopsy. From the degree of damage, he hopes to deduce the animals' final state of awareness. When is a minke—whose tail might still be trembling—brain dead, as opposed to concussed but partially conscious? It is a tricky, unsettling subject, a disquisition upon the nature of existence and dying.

"I am on the animals' side in a way," says Øen, who is under contract with the government to train whalers in the use of the penthrite harpoon. "They are going to be killed, so I want to see it happen as fast and painlessly as possible." Almost as he speaks, a Norwegian whaling boat farther north is reeling in a harpooned minke when the animal revives. It rams the ship, causing the mast to break and sending two crew members in the crow's nest toppling into the sea, busting the ribs of one. Then the whale escapes. The news soon zings around the world under such headlines as "Don't Get Mad, Get Even."

Someone with a similar philosophy once sneaked aboard the *Nybræna* and scuttled her. Understandably, the Olavsens clan is wary of strangers asking questions about minkes. Photographer Flip Nicklin and I pass the *hvalbiff*—whale steak—test, diligently eating helpings for lunch. It tastes like beef, with no hint of the sea. Norway, which used to sell the purplish red meat only within its borders, will soon begin exporting it to other countries that take exception to CITES. Jan Odin asks whether we like

Greenpeace, pausing a beat before passing us green peas, then says, "Animal rights groups project an image of big, bloody factory ships running down whales, not small family operations like ours going on a real hunt."

The Olavsens agree to let us follow in another boat. Glaciers on the distant mainland snap into focus, and colors spread across the calm water like dyes in molten glass. These are ideal harpooning conditions. Except the whales are scarce at the moment. The hours flow on in unexpected tranquility, and we return to port empty-handed.

Most Japanese hunts for minkes take place far from shore in some of the roughest waters on the planet—the ocean encircling Antarctica. Requiring bigger ships and crews, those ventures occur on a more industrial scale. This is one of the reasons they are controversial. Another is that minkes hauled aboard for scientific study end up as meals in Japan.

"The provision for scientific whaling requires us to fully utilize the by-product by selling it to markets," says Masaki Sakai, a fisheries adviser at the Japanese Embassy in Washington, D.C. "All the revenue goes to



KEN BALCOMB

The death grimace of a minke aboard a whaler exposes its feeding apparatus—a powerful tongue to push water with fish or krill through strainer-like baleen. The Japanese use teams of speedy vessels and factory ships to hunt minkes in the Antarctic. They keep sex organs and ear parts for research; meat, blubber, and the rest are sold as “whale bacon” and other products.





High seas drifters:
Two dwarf minke—
a southern form—
arise by Australia's
Great Barrier Reef.
Hundreds gather
here in winter, pos-
sibly to breed. This
hot spot was dis-
covered in the
1980s; no one yet
knows for certain
where they calve.



our nonprofit Institute for Cetacean Research to fund further work. Our studies have shown that minke whales are able to reproduce more rapidly than people thought and that stocks are plentiful in the Antarctic seas.”

“Japan has learned more about the animal’s biology,” agrees Robert Brownell, a National Marine Fisheries Service (NMFS) biologist on the IWC scientific committee. “But the majority of scientists do not believe such information is necessary for future management. Japan has taken thousands of minke whales over the years now. Although scientific whaling is not a violation of the moratorium, many see it as a violation of the spirit of the moratorium. Moreover, the IWC declared the seas around Antarctica a sanctuary in 1994, yet Japan continues to take minke whales there.”

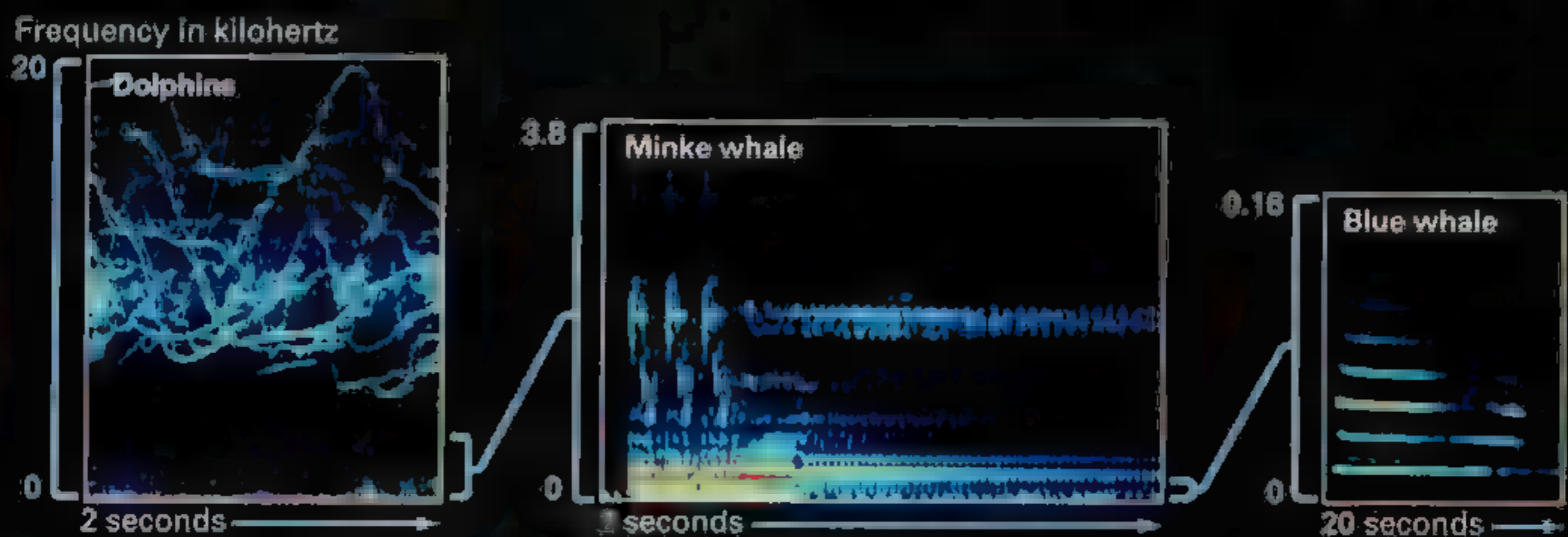
Brandishing chopsticks at the Moon Garden Restaurant, one of several Tokyo dining spots that serve *kujira*, or whale, I am seated between sliced fish and minke whales in the form of braised strips with spicy soy or mustard sauce. Chances are, the meat came via the sprawling Tsukiji Market downtown. There, minke whales show up as slabs of raw flesh, smoked wafers, salted bacon, and packets of crunchy cartilage.

Hiroshi Tanaka will soon take over a shop inside the market from his father and mother. He tells me he has lost customers because of rising prices caused by the scarcity of whale meat. He is concerned for the future of both the shop and the whale. “I would not like to see an over-kill,” he says. “It is important to keep everything in balance.”

A shopper passing another whale-meat stall tells me, “When I was six or seven years old, it was whale, whale, every day whale. At school. At home. I got tired of it.” That was when the U.S. encouraged Japanese whaling after the Second World War to help relieve food shortages.

At that time the species being hunted were slow-reproducing giants such as the fin and blue, which have calves two or three years apart. By contrast, female minke whales can breed shortly after giving birth, wean their

“A crazy sound” unlike any other whale’s is what National Geographic grantee Jason Gedamke heard in his headphones (middle sound program, below) during his pioneering studies of dwarf minke vocalizations in Australia.



The startling, mechanical noise Gedamke picked up when he lowered hydrophones into the water—the first confirmed dwarf minke vocalization ever recorded—reminded him of deep-space laser sound effects from a science fiction movie. He calls the sound “Star Wars.” It’s lower than the whistles of dolphins, left, but much higher than the ultra-low frequency moans of a blue whale, right, which can travel more than 100 miles underwater.

NGM PHOTO COURTESY OF JASON GEDAMKE, UNIVERSITY OF CALIFORNIA AT SANTA BARBARA; PHOTO COURTESY OF CHRISTOPHER W. STANLEY, CORNELL UNIVERSITY



Alastair Birtles photographs "Diving with Humpback Whales" one of about 200 minkes he has catalogued on the Great Barrier Reef. Instead of chasing whales, researchers and photographers are tethered to a drilling ship and wait for minkes to surface by the dozen.

**Minkes are
at the center
of a global
debate over
the human
relationship
with all
whales.**

calves within a few months, and produce an offspring every year under favorable conditions. The IWC gives a figure of 120,000 to 182,000 minkes for the North Atlantic and another 13,000 to 50,000 for the North Pacific. Minkes in the Southern Hemisphere were previously thought to number between 510,000 and 1.4 million, but a recent review indicates that this estimate may be too high. Even so, the IWC's scientific committee has approved most aspects of a management plan that would permit the harvest of 5,000 to 10,000 minkes a year—still an ultra-conservative quota since it represents less than one percent of stocks.

"We don't decide if a harvest is right or wrong," says Doug DeMaster, another NMFS biologist on the committee. "We decide if it's scientifically defensible. But the IWC still has to vote. At that point, countries may oppose a management plan on ethical grounds."

Recently the Japanese presented a case for scientific whaling of Bryde's whales—rorquals about twice the size of minkes—and sperm whales. Although some IWC members supported the proposal, most opposed it. Japan issued itself a permit anyway and proceeded to take 5 sperm whales and 43 Bryde's whales along with 40 minkes in a North Pacific hunt. One IWC member, the U.S., retaliated by limiting Japanese fishing privileges off American coasts and threatening trade sanctions. Yet despite these actions Japanese whalers set off last November with plans to harvest up to 440 minkes from the protected waters around Antarctica during a five-month research voyage.

Few dispute the contention of Norway and Japan that there are enough minkes to sustain carefully controlled commercial hunting. But the general public seems convinced that whales no longer fit the creatures-as-commodities mold. Masaki Sakai couldn't agree less. "The whale resource is coming back as a food supply," he says, "and it could help problems with hunger around the world. People harvest all kinds of animals, in many cases just for sport. Endangered species and depleted stocks have to be protected, but we in Japan can't understand the special concern over whales. There is no reason not to harvest abundant stocks."

In 1999 the debate over minkes took a new twist. After analyzing more than a hundred samples of meat from restaurants and shops across Japan, a team of Japanese toxicologists and American geneticists announced two surprises: First, a quarter of what was labeled minke turned out to be from fully protected whale species or dolphins and porpoises. Second, half the meat held concentrations of heavy metals such as mercury and chemicals such as dioxin and PCBs. Further Japanese studies revealed that the contaminants could pose a serious threat to humans eating only a few ounces of minke blubber. Another study in the Faroe Islands north of Scotland showed brain and heart damage higher than normal in children whose mothers had eaten whale meat.

I keep picturing the minke brains Egil Øen showed me and wondering what goes on in those big convoluted organs, half again the size of ours. During the early 1980s more and more minkes began swimming around boats and scuba divers along sections of the northern Great Barrier Reef in winter. Such encounters grew frequent enough that a few companies added minke-watching to the reef adventures they offered.



Two marine scientists—Peter Arnold, with the Museum of Tropical Queensland, and Alastair Birtles, of James Cook University—helped staff from the Great Barrier Reef Marine Park Authority devise guidelines for the new enterprise before it overstepped sanctions against harassing marine mammals. Here's the deal: Snorkelers hold on to a rope behind a drifting vessel, leaving the choice of how closely and how often to interact entirely up to the animals.

"I was in the water with more than 200 a couple of years ago," Birtles says. "The average group size was two or three near the reef and closer to six in open water. We've had the count build up to 25 at a time."

The average encounter lasts around an hour. One in 1997 lasted almost 11 hours. What this says about minke mentality is anyone's guess. Fish will pause to scrutinize you. The least bright cow in a pasture may wander over for a look. But 11 hours?

Minkes in northern feeding ranges are not only fairly solitary but also relatively silent. The groups that show up along Australia's bright coral shoals are communicating through rapid grunts, growls, and bizarre *boi-oi-oings*. These creatures are so noisy that Jason Gedamke, of the University of California at Santa Cruz, has begun using hydrophones to track their movements by the reef and to try to pin down their still largely mysterious behavior.

A minke speeding along under the waves at a distance can seem a creature alien to the world most of us know. Then it rises for a quick breath. Granted, it may be broccoli breath. But that vital replacement of air makes you aware of a fellow mammal that has successfully made a home on this planet far longer than humans have across a far greater expanse. □

Eye spy: A minke lifts its head above water to take a breath and give photographer Flip Nicklin's vessel an inquisitive stare. Innate curiosity draws them to ships and within shooting range of whalers. There may be as many as a million minkes in the world's oceans—and whaling nations want to expand the hunt.

MORE ON OUR WEBSITE

Voices from the deep: Hear the sounds minkes make, recorded by whale researchers, nationalgeographic.com/ngm/0104.



Supper

The Outsiders

By Peter Godwin / Photographs by Tomasz Tomaszewski



Cutting hay on the outskirts of a Romanian village, Ionel Stoian, like many Gypsies, lives at society's margins. Once thought to be natives of Egypt—hence the name Gypsies—the Roma, as many call themselves, originated in India. Today, around the world, they struggle to assert their rights while sustaining their culture.



"My position is unique among my people," says Éva Horváth, a reporter, editor, and the host of Roma Magazine on Hungarian television. Society rejects the Gypsy, says Horváth, because negative stereotypes are easier to accept. "I wish more Roma would have the opportunity to realize their dreams. Unfortunately, it's not mainly up to them."



On the road again, Roman Catholic Gypsies—Gypsies embrace many faiths—journey across Europe each summer to the basilica at Lourdes, France. They make this pilgrimage seeking



friendship, honesty, and a touch of grace in a world that has long shunned Gypsies as pariahs. One small blessing for the affluent is the car, which has all time driven the Gypsy horse car into history.

EVERY MAY 24 in France's Camargue, Les-Saintes-Maries-de-la-Mer, a small town of 2,500 set astride the muddy fingers of the Rhône Delta, is invaded by some 10,000 Gypsies. They come from all over Europe to honor their patron saint, Black Sarah. St. Sarah is not a real saint at all. It seems oddly fitting for a people who are perpetual outsiders that even their patron saint is an interloper. These Roman Catholic Gypsies have embraced the legend of Black Sarah, the maid to Mary Jacobe and Mary Salome, Jesus' aunts. After the Crucifixion they were cast out upon the sea in a boat with no oars by the irate Romans and washed up here in the Camargue, France's cowboy country.

The black wooden statue of St. Sarah, resplendent in a gold tiara and a pink lace robe studded with sequins, stands in the arched crypt beneath the town church. (Because she is not a real saint, her statue cannot be displayed on the consecrated ground of the chapel above.) Inside, the air is hot with the flames of a thousand votive candles. The Gypsy pilgrims run their hands over her face, worn now from the touch of so many fingers. Some have left their shoes at her feet. Thank-you notes and photos and offerings are stuffed into the collection box, and plaques of gratitude line the walls: a baby conceived, a mother recovered.

With a few days to go before the ceremony itself—a ritual cleansing of the statue in the Mediterranean—there are already 1,600 Gypsy caravans in the municipal campsites. Most are not folksy wagons but motor homes with satellite dishes bolted onto the aluminum siding. And the Gypsies who inhabit them wear T-shirts with Nike swooshes and chatter incessantly on their cell phones.

But the good citizens of Les-Saintes-Maries are not enthusiastic hosts to *les Gitans*—the Gypsies. Indeed some of the shopkeepers have boarded up their premises and left town. And this year an extra 200 riot police and a helicopter have been drafted in from Montpellier. Today the mayor has arranged a press conference in the town hall to recount the havoc of previous Gypsy pilgrimages (which are attended by almost as many non-Gypsy tourists):

mountains of garbage scattered around, theft, drunkenness, and property damage.

Later, at lunch at a local café, the one-eyed Moroccan owner, Magrid, joins in the anthem of alarm. "This?" he says, pointing to his vacant socket. "I lost it in a fight with a Gypsy. He pulled a knife on me." Almost everyone here has a story like that, some incident designed to italicize the casual violence and unsteady tempers of these roving visitors. The sedentary person's fear of the nomad is an ancient one, and modern polls still attest to it.

Hostility to Gypsies has existed almost from the time they first appeared in Europe in the 14th century. The origins of the Gypsies, with little written history, were shrouded in mystery. What is known now from clues in the various dialects of their language, Romany, is that they came from northern India to the Middle East a thousand years ago, working as minstrels and

mercenarys, metalsmiths and servants. Europeans misnamed them Egyptians, soon shortened to Gypsies. A clan system, based mostly on their traditional crafts and geography, has made them a deeply fragmented and fractious people, only really unifying in the face of enmity from non-Gypsies, whom they call *gadje*. Today many Gypsy activists prefer to be called Roma, which comes from the Romany word for "man." But

on my travels among them most still referred to themselves as Gypsies, and I have tried to reflect the common usage of the people themselves.

In Europe their persecution by the *gadje* began quickly, with the church seeing heresy in their fortune-telling and the state seeing anti-social behavior in their nomadism. At various times they have been forbidden to wear their distinctive bright clothes, to speak their own language, to travel, to marry one another, or to ply their traditional crafts. In some countries they were reduced to slavery—it wasn't until the mid-1800s that Gypsy slaves were freed in Romania. In more recent times the Gypsies were caught up in Nazi ethnic hysteria, and perhaps half a million perished in the Holocaust, which the Gypsies call *porraimos*—the great devouring. Their horses have been shot and the wheels removed from their wagons, their names have been changed, their women have been

"We're naturally secretive because we have such a long history of persecution."



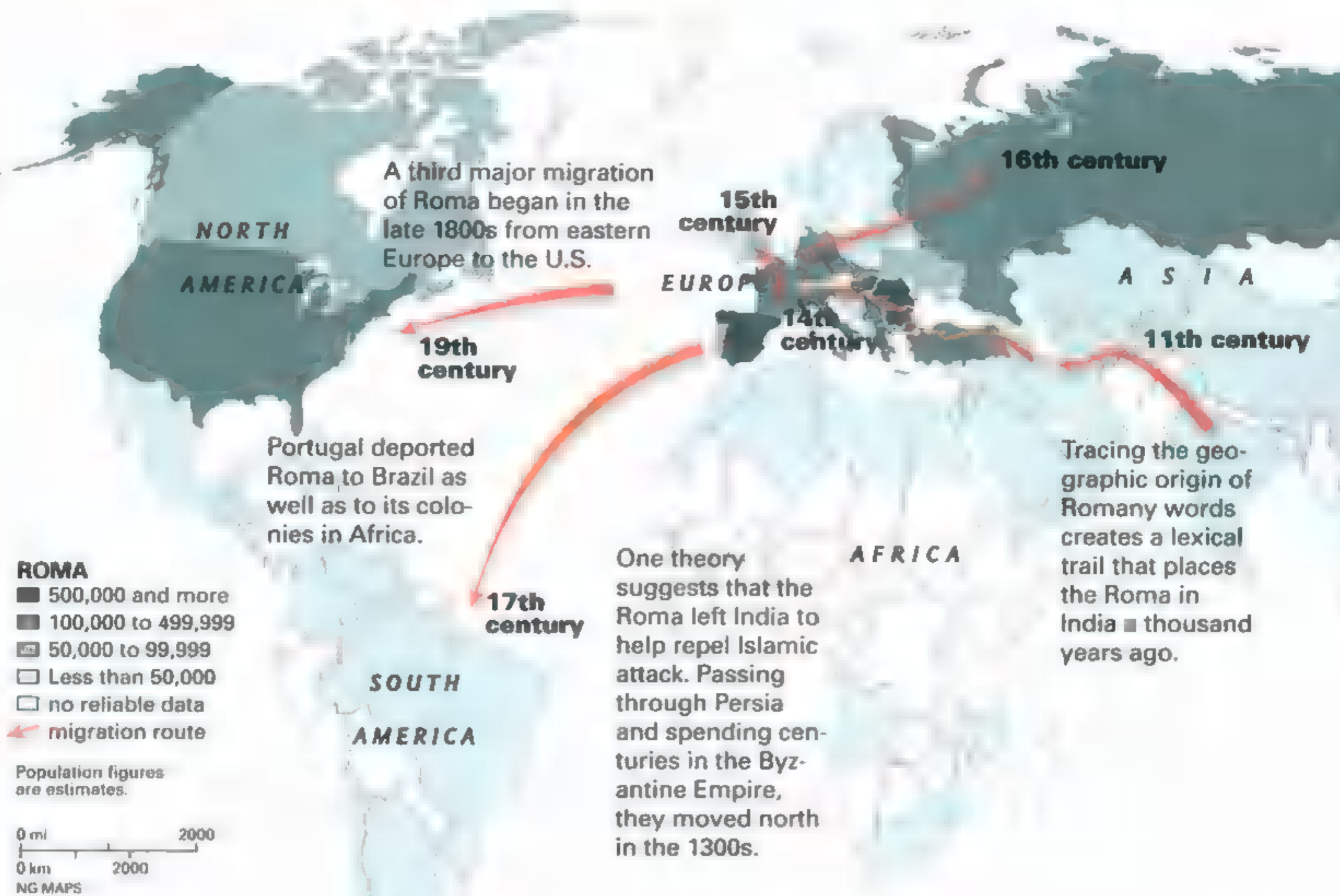
Jan Malachuk, a Gypsy, met his wife, Bronislawa, a non-Gypsy, when he was a Polish resistance fighter during World War II. Many Gypsies still oppose such mixed unions.



Luxurious residences in the Romanian village of Iuzesti exhibit the wealth enjoyed by many Gypsies, whose tastes have been influenced by their travels among the world's



Romanian word for non-Gypsies. Their homes rose after the 1989 revolution deposed dictator Nicolae Ceaușescu, who outlawed private wealth and suppressed Gypsy language and culture.



sterilized, and their children have been forcibly given for adoption to non-Gypsy families (a practice in Switzerland until 1973).

But the Gypsies have confounded predictions of their disappearance as a distinct ethnic group, and their numbers have burgeoned. Today there are an estimated 8 to 12 million Gypsies scattered across Europe, making them the continent's largest minority. The exact number is hard to pin down. Gypsies have regularly been undercounted, both by regimes anxious to downplay their profile and by Gypsies themselves, seeking to avoid bureaucracies. Attempting to remedy past inequities, activist groups may overcount. Hundreds of thousands more have emigrated to the Americas and elsewhere. With very few exceptions Gypsies have expressed no great desire for a country to call their own—unlike the Jews, to whom the Gypsy experience is often compared. "Romanestan," said Ronald Lee, the Canadian Gypsy writer, "is where my two feet stand."

THE PRINCE of the pilgrimage at Les-Saintes-Maries is Pepe La Fleur. He's been coming here for 40 years. During the winter he and his family weave rattan furniture. In the summer they tour Europe selling their wares. Pepe's wooden wagon, which he tows behind a van, is

decorated with painted flowers and a border of yellow fleurs-de-lis. There is a high, curtained bed across the end of the wagon, and underneath doors open to reveal another bed for children. He has 13 of them and 65 grandchildren, most of whom help him in the rattan-weaving business, just as he did for his parents before him. But this continuity is illusory—the old ways are over, says Pepe La Fleur. "We didn't used to go to school. We traveled constantly, and we were always chased away from one town to the next, and often we had to hide in the forest. It's better now, because every town in France with a population over 5,000 has to have a field reserved for Gypsies, by law.

"But in a few years there will be no Gypsies left here. They are all buying houses and living differently. They are mixing with other kids and intermarrying, and the culture is becoming diluted. Before, it was unheard of to marry a non-Gypsy. Now my own daughter has married one."

At night the Gypsies turn the town into one huge series of parties. A favorite venue is Les Vagues (the Waves), a small bar that buzzes until dawn. As I arrive, the din of chinking glasses and smoke-scratched voices dies down at the imperious strum of acoustic guitars, and seven men launch into an up-tempo, flamenco-style ballad. This is a family sing-along by

AUSTRALIA

A thousand years ago they left India, although no one knows exactly why. Nomadic groups that still cluster near Bikaner, India (top right), though not Gypsies, provide an echo of that exodus. Europe is now home to 8 to 12 million Gypsies, with more than a million others scattered worldwide. In Appleby, England, local Gypsies convene each summer, nominally to trade horses (middle) but mostly to socialize. In Florida automobile broker Robert Adams helps his wealthy clients acquire high-end sports cars like the Ferrari 360 Modena for \$180,000.





Poverty drives Vilma Mihai and her family as they trek to a Romanian town to lounge for raw diamonds to sell. In their village neighborhood of some 50 families, there is no public tap for water and no school.

the Reyes family, the chart-topping Gypsy Kings, who come from the nearby city of Arles.

A few days later, in another Gypsy pub, the gloomy Bar L'Écluse (the Lock), on the side of the highway near Arles, I find Jean Reyes, the patriarch of the musical dynasty, his face now lined with drink and age. He feeds a slug of pastis through a gap in his gray beard, pats his Chanel bandanna, and adjusts the sunglasses that ride high on his wild spume of white hair. "My family always used to make their living with horses, buying, breeding, breaking, betting," he remembers. "My father was very strict—he wanted all of us to work—which is very unusual for us Gypsies."

He signals for another drink, using his left hand—his right hand, injured in a fall, is bound in a polka-dot sling. "My best horse of all was an Arabian stallion—I went to Algeria myself to find him. I used to ride without saddles or

reins—just holding on to the mane. But life has changed so. When I was young, I couldn't sleep in a normal bed. Now most of my children have nice houses. But me? I couldn't live in a house; it would be like a jail for me."

THE EXPERIENCE of the Gypsies in France and elsewhere in Western Europe has diverged sharply from those in Eastern Europe, where most Gypsies are to be found. There they have just lived through a half century of communism, under which they were pressured to settle and to assimilate. Very few of them are now nomadic.

Slovakia is home to about half a million Gypsies, in a total population of five million, one of the highest ratios of Gypsies to gadjé anywhere. At current rates of population growth, Gypsies will outnumber Slovaks by about 2060. Most Gypsies here live next to old, established

villages like Hermanovce, nestled into the foothills of the Tatra Mountains in the rural east of the country. A little brook choked with rags and bottles, tins and plastic bags, runs down through the Gypsy quarter, whose 300 residents are crammed into shacks made of logs and mud. Improvised roofs of sheet metal are weighed down against the tugging wind with rocks and old tires. It is a scene of medieval squalor.

There is a social hierarchy of sorts: The poorer you are, the lower down the slope you live. The man in charge is Miki Horváth. He has hennaed hair and light blue eyes, a walrus mustache, and a blurred amateur tattoo of a cowgirl on his right bicep. "My great-great-great-grandmother was born here," he says. Before that he's not so sure. "We traveled from country to country. But I don't know where my ancestors came from. We heard that we came from India. That's what white people say, anyway. They shout at us, 'Go back to India!'"

Miki invites me into his house on the top of the hill—it is surprisingly neat and cozy inside. His family is crowded around the TV, watching their favorite Mexican soap opera, dubbed into Slovak.

Not a single Gypsy here has a job. "The last time I worked was in . . .," Miki scratches his head, "about 1989. I think. I was digging ditches. No one wants to employ us. We go to the employment office in the city looking for work. But when they see we're Gypsy, they don't want us. Maybe it's because we have a low level of education." Not a single Gypsy child here has been to high school. They are channeled into special schools for kids with "learning difficulties," because when they start school, the children cannot speak fluent Slovak. This happens in the Czech Republic as well, and it only deepens the cycle of poverty. "My ambition was to be a waiter in a bar, serving food and drink," says Miki dreamily. "I tried to get into waiter school, but I couldn't add up the bill."

The Hermanovce Gypsies survive on monthly social benefit payments: 1,500 koruna (\$32) per family member. Like many Gypsies in Eastern Europe, Miki says life was easier under communism. "We had jobs, and social benefits were better, and no one oppressed us. Now, under

democracy, all these skinheads attack us when we go into town to collect our benefits."

Irena Čonková and her husband were attacked in 1999. "The skinheads ambushed us from behind the rubbish bins where they were hiding, and they punched us in the face with knuckle dusters. And when we went to the hospital and told them what had happened, they didn't believe us. They thought we'd been fighting among ourselves. Now when we go to town, we only go in big groups, for safety."

Though their culture seems degraded, the Gypsies in Hermanovce have a strong sense of their own clan's position, and they save their disdain for the Gypsies in the neighboring village of Chminianske Jakubovany. Irena Čonková lowers her voice and hisses, "They eat dogs. If we ate dog, we would die of disgust." But that does not get in the way of commerce. "We often sell dogs to them," says Irena. "Just the other day they took two dead dogs off our trash heap and paid us for them with an old watch."

When I tell the Čonkovás I want to visit them, Miki's eyes widen. "Be careful," he warns. "They are bad people, and they don't like the gadje."

At Chminianske Jakubovany a few days later, I stop in at the local store to gauge the mood. The Slovak shopkeeper can barely contain her hatred. "They should put all the Gypsies in a paper boat and send them to Africa. They are like locusts. When the old agricultural co-op shut down, they picked it bare within two weeks, roofs, windows, doors. They scavenged the lot. They steal everything, our dogs, our cows, the vegetables from our gardens. The week before they get their social security is always the worst; that's when they're short of money. They just want to drink and smoke and make babies. Fifty years ago there were only three families of them here. Now there are only 400 of us and 1,400 of them. Soon it'll be like that in the whole country!"

Her tirade is interrupted by the arrival of Tomáš Horváth, a local Gypsy. I ask him if he has any dog lard for sale, and he instructs me to follow him to his neighborhood. It is made up of substantial wooden cottages, one of the most prosperous villages I've seen in Slovakia.

Their skill has been to survive among those more powerful and entitled than themselves.

Immediately I'm surrounded by a great crowd, many of whom are proffering jars of congealed dog fat. "We feed dog lard to our babies, and it makes them strong," says Horváth.

"Yes, just look at us," cries another man. He lifts his vest, grasps a roll of belly in both hands, and flubbers it.

"We make dog lard into soup and drink it in our tea or spread it on our bread," explains Horváth. "If you smear it on your chest, it will cure asthma, bronchitis, and emphysema. To make it, we scrape the fat off the dog skin—an eight-to-ten-year-old dog is best—and boil it."

AFTER WORLD WAR II many rural Slovakian Gypsies were relocated by the government to work in the factories of the industrial heartlands of the Czech territories. But when the Velvet Revolution toppled communism in 1989, Gypsy jobs tended to be the first lost as the economy lurched from central to market control. And while there is a small, assimilated Gypsy intelligentsia, today Czech Gypsies typically live in grim tenements in the cities. A combination of bleak economic prospects and a spate of skinhead attacks, contrasted with the glittering enticements of a Western Europe no longer cordoned off by an iron curtain, has lured thousands of Gypsies westward to work illegally, to beg, or to claim political asylum. An alarmed European Union has reacted with successive immigration crackdowns and visa restrictions that ensnare Gypsy and gadje alike, causing still more friction between them.

At a prison outside Prague in Říčany, more than 50 of the 200 inmates are Gypsies, way over the ratio in the general Czech population. Every evening before bedtime they sit in their communal cells in their blue denim overalls strumming acoustic guitars and singing mournful laments to the women they have loved. Like most prisoners they're reluctant to detail their crimes, but the jailer tells me later that they've mostly been convicted of mugging, theft, and burglary.

"From the time they are on their mothers' laps," complains Andrej, one of the Gypsy inmates, "white children are taught that Gypsies are bad. The Gypsy stereotype shown on TV is

always of poor, uneducated Roma. But we have artists, musicians, and rich men too, you know. It's just that when Gypsies make money and raise themselves, it's easier for them not to look back. You can count on the fingers of one hand the Roma who reach back down to try to help the rest of us."

Miroslav Zíma is one such Rom. He works in the Czech Republic's second city of Brno, in a dilapidated neighborhood nicknamed the Brno Bronx. Here he helps Gypsies renovate old buildings for themselves, teaching them building trades in the process. He takes me on a tour of a large residential building overlooking a central courtyard, recently refurbished with the help of Dutch aid and now inhabited by 200 Roma who worked to rebuild it.

His black tracksuit and close-cropped hair reflect the 18-year career Zíma had in the Czech Army, rising to the rank of major—most unusual for a Rom. He is candid about the difficult relationship between the educated Roma and their communities. "The work I do today is not a job, it is a mission. I feel a debt to the Rom community, because I turned my back on them for so long. Many Rom intelligentsia leave the community so as not to be dragged back down by them, or we are expelled by them for mixing with gadje."

On the ground floor Zíma walks me through the well-equipped carpentry workshop that he has provided, but he admits he is disappointed that few of the residents are interested in it. And indeed he has great difficulty in attracting enough self-help recruits to these renovate-and-inhabit schemes. As we talk, a gaggle of glassy-eyed Rom youths stagger by in a miasma of glue fumes.

"With the paternalism of communism gone, the Roma have been shocked by the chaos of democracy," he says. "They had got used to a culture of dependency." Most adults here are unemployed and stay at home all day, with the children at school often the only connection they have with the outside society. And so the gap between the worlds widens.

But Zíma shrugs off the victim role that some Rom activists have embraced. "Rom officials compete with each other to blame racism

The sedentary person's fear of the nomad is an ancient one, and modern polls still attest to it.



Seasonal nomads, a Gypsy family takes a break from making and selling bricks in rural Romania (top) before settling down for the winter. In France a network of trailer parks provides a home for the nation's so-called bohémiens (middle). Getting comfortable, Juan Bruno and his grandson and niece enjoy the security of his own home in Seville, Spain.



Letting the spirit move her, dancer Sonia Cortes Cortes takes it to the street in Arles, France, with a passion that speaks of the Rom love of music and a rhythm that resonates



down to her roots. "I'm tired of dancing!" says another Gypsy performer, incredulous. "I don't need to dance to be a dancer. Dancing? That's for people who aren't Gypsies."

for all their ills. But every time you want to help a Rom, they put out their hands and ask for more. Here, in this project, we try to teach them to be more self-reliant.”

The threadbare social benefits system in Romania—which with perhaps two million Gypsies is the biggest Gypsy cultural reservoir in the world—has forced them into self-reliance. Having lost their jobs on collective farms and in state factories, many have fallen back on their traditional occupations—brick-making, horse trading, and metalworking—to eke out a living. The result is that the old Gypsy social system loosely based on occupation is at its most pronounced here.

In a whitewashed house on a narrow cobbled street in the capital, Bucharest, a group of intense young Rom activists are hunched over computer terminals, trying to increase the political reach of the Gypsies. Their fingers fly over the keyboards, entering the identity details of Gypsies who live in the city.

“Without ID,” explains Costel Bercuş, the 23-year-old director of Romani CRISS, the Roma Center for Social Intervention and Studies, “you simply don’t exist here. But many Roma don’t have papers—they fear the authorities.” Now Bercuş and his squadron of young Roma are touring the city trying to convince the Roma that it is the time in their troubled history to stand up and be counted. That they have a right to be heard.

In recent years the fate of the Roma has been catapulted to prominence in Romania, Hungary, Slovakia, the Czech Republic, Poland, and Bulgaria by those countries’ applications for European Union membership. Under minority rights provisions, steps to end discrimination against the Roma must be in place before their candidacies can progress.

The activists at Romani CRISS are representative of the 600 Rom university students throughout this country—perhaps the vanguard of a new elite—cultural scouts who are learning how to deal with the gadje. Many of them are children of partly assimilated Roma—those who were put to work in collectives and factories under communism. In fact perhaps half of Romania’s Gypsies have lost the Romany

tongue, discouraged by the old regime, though many are now relearning it.

DESPITE THE PRESENCE of desperately poor Gypsies in Romania, it is also a country that thoroughly banishes the stereotype of the poor Gypsy, as I discover driving west of the drab concrete city of Alexandria. There I catch sight of a mirage in the low, early morning sun—an astonishing sea of turrets covered in shimmering silver scales rises from the flat fields of brown. It is an architectural hallucination, the mongrel offspring of Bavarian castle and Japanese pagoda, a zany Gypsy Disneyland. These competing palaces of prosperity dominate the town of Buzescu, home to over a thousand members of the Kalderash clan—Gypsies who were traditionally coppersmiths. Stretched between the spires of the turrets, hanging like banners, the names of the owners are sculpted

in zinc, broadcasting a message clear across the Danubian plains of southern Romania, a whooping visual cheer to the ingenuity of the Roma.

The biggest of the villas is owned by Marin Stoica, the *bulibasha*, the unofficial village leader. Today he is in the hospital, suffering from diabetes, and I am shown around by his granddaughter, Daniela Constantin, whose smile reveals four glinting

gold front teeth—gold not for dental reasons but reasons of Kalderash aesthetics. Her limbs too are festooned with gold. And like almost all the Gypsy women here, she has a necklace made from large gold Austro-Hungarian coins.

Buzescu’s grand houses sprang up in 1990, after the Romanian revolution, she tells me as we stroll through the cavernous, marble-lined rooms of the house, past computers and large-screen TVs, repro antique furniture imported from Italy, and pastoral tapestries on the walls. A marble-and-limestone staircase sweeps down four floors, its balustrades anchored in the hall by two statues of Greek archers; nearby is a small grove of plastic palms draped in tinsel.

Before the revolution, she says, “We were afraid to show any signs of wealth, because Ceauşescu would want to know where it came from.” The Romanian dictator Nicolae Ceauşescu forced many Gypsies into government

Gypsies have confounded predictions of their disappearance as an ethnic group.



They found Nicolae Ciurar dead in a Polish canal, an accidental drowning. Too poor to send the body back to Romania, his family buried the three-year-old in Warsaw (top). Growing up fast in Romania, 16-year-old bride Mirabela Soare ponders her wedding day (middle). By tradition, family and friends helped pick the groom and prepared the feast as well.



They look sick and handicapped, but everything in this picture is fake — except the pregnancy — says photographer Tamasz Tomaszewski. He watched as a group of young Gypsies



in Bucharest transformed themselves into a soiled, wary band of streeturchins to elude gangsters—and spare others—from gossip. “It’s a strange theater with a sad mood,” says Tomaszewski.

housing that became ghettos and tried to suppress their culture. Many had their stashes of gold coins, accumulated through generations, confiscated by the notorious secret police, the Securitate.

The Kalderash are modern alchemists, turning base metals into gold by harvesting the metal skeletons of the industrial behemoths of the communist era and selling them off. When Daniela's husband, Ștefan Mihai, joins us, he (like most Kalderash I met) doesn't want to go into the specifics of his business—the line of the law is a rather blurred one in Romania's transitional economy, and competition for contracts is fierce.

Ștefan says he has encountered very little anti-Gypsy prejudice, but like many wealthy Roma I met, he has a little of his own. "We absolutely won't do business with any Roma we don't know, because they are dangerous. But with Romanians it's different. They don't try to cheat you like Roma do. We have no problem with Romanians—we employ them as chauffeurs and bodyguards."

The image of "the dangerous Gypsy" is actively promoted by some Gypsies seeking to distance themselves from "bad elements" by acknowledging gadje fears. And it works both ways—the wealthy Kalderash in Buzescu scorn poor Gypsies, but in the next town I found a community of Fulgari Gypsies, who earn a precarious living by traveling in horse-drawn wagons to buy duck down from peasants and sell it to wholesalers. The Fulgari hold up their poverty as a proof of honesty. "The people of Buzescu," scoffs their leader, Florea Sima, "they steal, but we are honest. The poor Gypsies are the honest ones. The rich do all the illegal business."

That night I return to Buzescu for a Gypsy christening at the Romanian Orthodox church. Throughout the ceremony the high spirits of the chattering Gypsies threaten to overwhelm the solemnity of the Orthodox rite. "Their mentality is different from ours," says the priest, Marinică Damian, later. "I once baptized a boy at nine and did his wedding at twelve! It's their law to get married as soon as possible, to retain the seed in the same families, to keep their fortunes intact." Just then the old caretaker bustles up and tugs his sleeve. "Those crows!" she

exclaims, referring to the Gypsies by a common slur. "They've gone and stolen the soap."

Later, at the christening feast, a gang of teenage boys mills around me. All are married. The youngest is 14. He wears his baseball cap backward and speaks in a piping, unbroken voice. Do you stay in the same house as your wife, I ask? "Of course, we sleep in the same bed," he boasts. But when I ask if he has any children yet, he casts his eyes downward in embarrassment. "No, not yet," he admits, and runs off to play.

Clan and wealth distinctions like those between the Kalderash and the Fulgari, accentuated by centuries of nomadism and slavery and dispersal through many different countries, have created a Rom diaspora that lacks any centralized hierarchy. It is one of the reasons Roma have been so easy to oppress. But this is changing. The first World Romani Congress met in 1971 in England. It was attended by Gypsies

from 14 countries, who adopted an anthem and a flag and began moves toward standardizing the language. Since 1979 there has been a Rom adviser at the Economic and Social Council of the United Nations. Today there are a number of international Rom organizations that monitor Rom civil rights, lobby for an end to discrimination, and have recently begun negotiating for compensation for Holocaust victims.

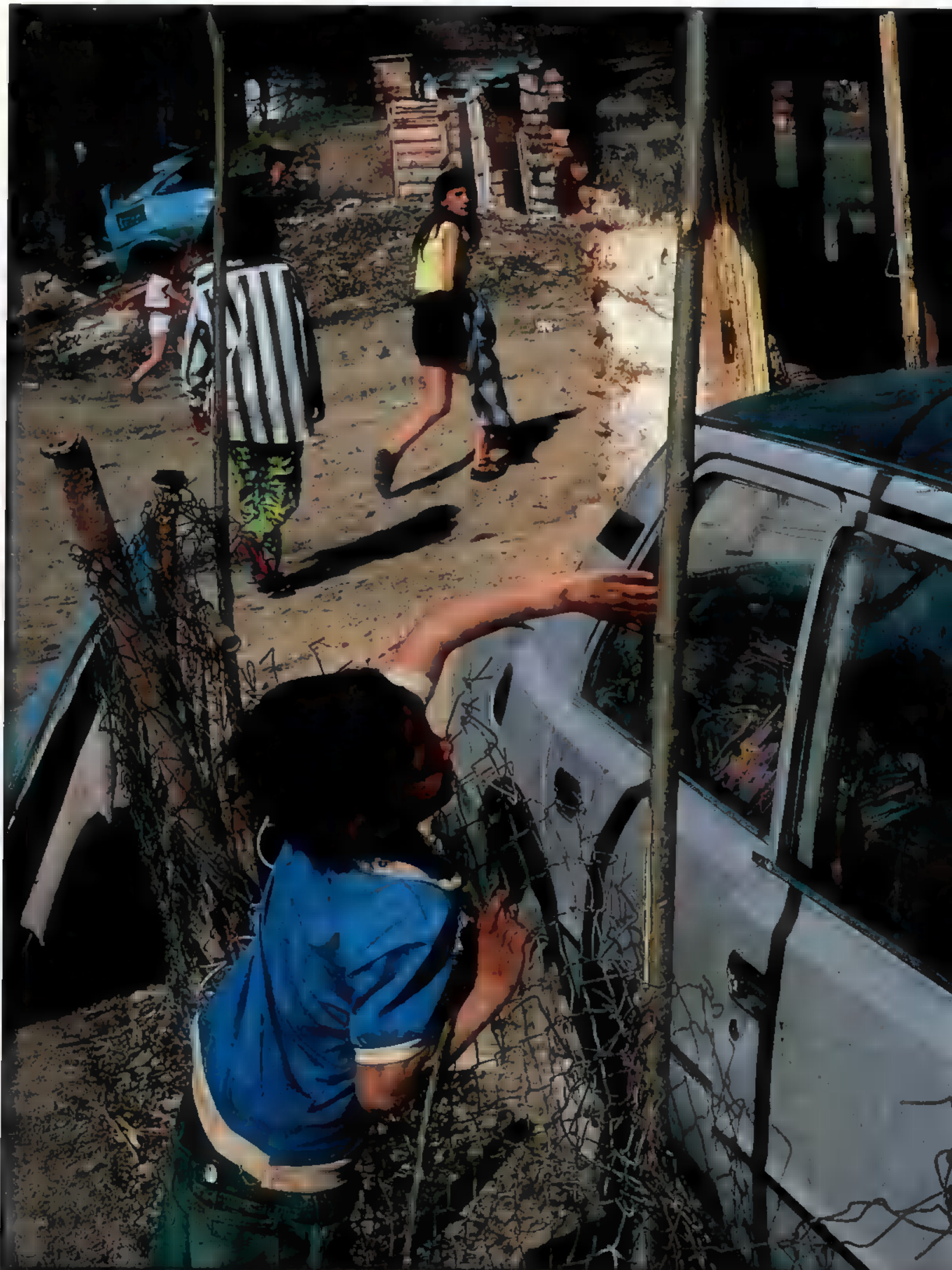
Here in Romania there is another attempt at providing Gypsy leadership. Florin Cioabă is the "International King of the Gypsies." I know this because it is embossed on his business card, next to a picture of him wearing a heavy gold crown and clutching a gold scepter. His black Mercedes too has a regal cue: Its vanity plates bear the letters RGE, the closest they could get in a three-letter limit to REGE—Romanian for "king." And a crown has been sculpted into the side of his pebble-dashed villa.

"My father, the first king, was the only Rom leader in Romania to be recognized by Ceaușescu," announces Cioabă. (Ion Cioabă, who died in 1997, played a role in agitating for Gypsy rights.) "After 1990, when many Gypsy organizations suddenly appeared, the idea came to us to have a king as a symbol of Rom people the world over, someone who could be their savior."

With very few exceptions they have expressed no great desire for a country to call their own.



Self-crowned King of the Gypsies, Florin Cioabă of Romania (top) is not a real monarch, though he is a prosperous leader in his community. In Spain antique dealer Celedonio Manzano carries on the family business (middle). Yet fortune-teller Millie Marks of the United States sees the Gypsy flame flickering out. "Young people don't want the lifestyle we had."



Getting nowhere fast, children in the village of Hermanovce, Slovakia, let their imaginations take them where reality rarely goes. Education, for instance, is often a dead end. Since



Gypsy children are not proficient in Slovak, many are discriminated in schools for the mentally hand-icapped. Less than a third of all Rom children in Europe regularly attend school.



Sinking out the fog of mud, Gypsies huddle in a camp in Hermanovce. Nations and other nations need to join the European Union must demonstrate improved treatment of minorities.

When I ask King Florin about his royal rival and co-pretender, the Emperor, who also happens to be his cousin, he is peevish. "My cousin is only nicknamed the Emperor—there's nothing imperial about him." In the midst of our conversation, the King is called away to the nearby construction site where his new church is rising. Like an increasing number of Gypsies, he has been won over by the Pentecostals and is now a pastor himself.

As I leave, his wife arrives, dressed in a traditional Kalderash outfit, long bright skirts and plaits and head scarf. "Are you the Queen?" I ask. "No, no," she says, curtly. "I'm just his wife; I'm not involved in this royalty business."

The following day, while chatting with a group of Gypsies in the small Transylvanian village of Dealu Frumos, I get an insight into a side of the Roma that I have been constantly warned about but have not yet encountered.

A young man and his friends are telling me about *tsigani de casatsi*—house Gypsies—"bad ones, who don't work on the land like us but just steal for a living." Without warning, he wrenches my notebook from my hands and shoves me against the car. I am punched in the kidneys, and my arm is twisted behind me. A blade is held to the side of my neck, and suddenly I am surrounded by roaring Gypsies, maybe 30 of them, more appearing every few seconds from the surrounding houses. My translator, Mihai, is punched in the head. "Money! Money! Money!" his tormentors bellow. I am allowed into the car to retrieve my bag, but Mihai is kept outside, a hostage to my ransom. I offer all the money from my wallet, and Mihai pulls free and throws himself into the back seat. As we drive off, we do an inventory of our injuries. Apart from bruises and shock, my main injury is to my hitherto benign

image of the Roma as a wronged and misunderstood people.

Then the words of Nicolae Păun, a Rom politician I met in Bucharest, come back to me: "If a Rom commits a crime," he said, "he's not treated as an individual, the whole community has to pay the price, the dignity of *all* Roma is hurt." So I do my best to confine the blame for this particular episode to the individuals involved.

ONE OF THE WAYS the gadje punished Gypsies in the past for what was perceived as antisocial behavior was by deporting them. A few Gypsies arrived in North America as indentured servants or prisoners not long after the Pilgrim Fathers, having been expelled from England under laws like the Punishment of Rogues, Vagabonds, and Sturdy Beggars Act. But most of the Gypsies living throughout the United States—estimates range from 75,000 to a million—trace their roots to eastern and central Europe.

George and Veronica Kaslov live in New York's East Village, in a tiny first-floor apartment sandwiched between tattoo parlors and falafel joints. The front room is Veronica's fortune-telling parlor, equipped with crystal ball, tarot cards, and a map of the palm of a hand. "Real Psychic Reader" declares her handbill. "Advisor To Your True Destiny—For Peace of Mind—Discover your internal power for happiness and success." It also doubles as the office of the Lawyers' Committee for Roma Rights and Recognition, a legal aid society set up by George to fight anti-Rom prejudice in the U.S. Special police task forces targeting Gypsy con artists are evoked by Rom activists as an example of this prejudice, although police deny that such task forces exist. However, since many Gypsy men work in trades that are susceptible to con artists—car dealers and repairers, roofers, and pavers—Rom activists claim that the stereotype of Gypsy as criminal remains prevalent.

"There's a will within us to survive as a people," says Kaslov, whose grandfather, a Vlach Gypsy from Russia, arrived almost a hundred years ago. "All the other ethnic groups who come to America, they tend to assimilate after a few generations; they lose their customs and

language. But not the Rom. We hold out." One barrier is the Rom purity code of *marimé*, a complicated set of taboos. For example, a towel used to dry the lower half of the body must not touch anything above the waist. *Marimé* also covers relationships, conversational topics, and food. To break the code can mean expulsion. All gadje are presumed to be unclean, because they don't follow the *marimé* code.

There is a marked schism between the established American Roma and more recent Gypsy arrivals, who tend to be less traditional and more assimilated, says Kaslov. "They come seeking education and jobs, whereas we don't like to work nine to five for the gadje."

American Vlach Gypsies are one of the most closed Rom societies in the world. Partly this is because so many of them are descended from enslaved Romanian Roma, freed only in the mid-19th century,

with a strong suspicion of the gadje. It is only through George Kaslov that I finally meet Joe Marks, a Rom Baro, or Big Man, of Philadelphia, where he deals in scrap metal with his son Kelly. There is nothing about his outward appearance—gold-rimmed glasses, a chestnut pate fringed with white hair, and a well-tended white beard—that would suggest he is a Gypsy.

"We don't usually invite gadje into our houses," Joe admits, as he welcomes me in for dinner. "We don't want them poking their noses into our business." His wife produces a "pig-in-the-blanket," ham baked in a pastry crust, before withdrawing to the kitchen, as is the Rom custom. Joe and his wife met only six times (and never alone) before they married. That was 35 years ago. His son-in-law, Paul McGill, explains that today Gypsy kids are still expected to marry young, to keep them within the culture. He's already scoping out a Rom partner for his 17-year-old son, Brian. "He's helping though," says Paul. "He tells me who to call! And nowadays there are Gypsy chat rooms on the Web, and they get in contact there too."

After the meal is cleared away, the serious business of the evening commences

Hostility to Gypsies has existed almost from the time they first appeared in Europe.

▶ WEBSITE

Check Sights & Sounds for a multimedia show narrated by photographer Tomasz Tomaszewski at nationalgeographic.com/ngm/0104.



The disorienting sense of not knowing quite where you'll land—it's a thrill for Gypsy boys playing in a makeshift gymnasium in the Czech Republic and a fact of life for Gypsies worldwide. Gypsies have

—a *divano*—a Gypsy mediation hearing in which Joe wants to settle a dispute that has resulted in assault charges against two young Rom men. Across America a network of Gypsy courts controls almost all Vlach Rom disputes, commercial and territorial—especially over rival fortune-telling spots and rulings on marimé breaches. They also grant Rom divorces—few American Roma officially register their marriages.

Joe talks quietly but firmly in Romany to the two men, pointing out the perilous consequences of their fight and demanding an end to their hostility as the price for his intercession with the authorities. By the end of the evening he persuades them to shake hands (though, as he puts it, one of them “would rather chew bullets”), and a phone call is made to a lawyer to arrange for the charges to be dropped.

Joe’s son Kelly gives me a lift to my car. In crocodile-skin cowboy boots and jeans he

appears thoroughly American. “I’m afraid we don’t have campfires or wagons or bandannas, earrings, or violins,” he jokes. “We don’t steal babies or pick pockets—maybe we’re not Gypsy enough for you?” Then he gets serious. “We may look modern and adapted on the outside, but on the inside we’re pure Rom. We’re naturally secretive because we have such a long history of persecution.”

Without a country to call their own, in a world changing fast around them, the fortune told for the Roma has often been grim. But historically their skill has been to survive among a great diversity of hosts, among those always more powerful and entitled than themselves, enduring both the fist of hostility and the bear hug of forced assimilation by remaining nomads of the spirit. □



long been romanticized as the epitome of freedom, says Professor Ian Hancock of the University of Texas, a Rom himself. But “the reality stands in stunning contrast.”

TRADE

FROM FIELD

FLOWER



TO WASH FRESH BLOOMS THROUGH A WINDING ROAD



BY VIVIENNE WALT

PHOTOGRAPHS BY SISSE BRINBERG



In the dead of an April night the lights on the bridges glitter on the ink black surface of San Francisco Bay. Most of the city dozes under fog, but at the corner of Sixth and Brannan Streets trucks honk and screech in a narrow alley between two giant warehouses. Inside the San Francisco Flower Mart, under the glare of fluorescent light, hundreds of people buzz around thousands of flowers: tangerine gerberas from California, orange, yellow, and purple birds-of-paradise from Hawaii, orchids of every hue from Singapore. Telephones bleat as



AS DAY DAWNS, a buyer shoulders exotic bouquets at the San Francisco Flower Mart.

customers call in orders from across the United States. Earnest is the quest for petals that are precisely the right firmness, flower heads exactly the right size.

The flower-selling business rests in no small part on human drama. One blossom can fuel a flaming passion, calm a raging jealousy, salve a sickness. Back in the 1960s you could join the social revolution just by sticking a flower in your hair. But there is raw commerce here too. After Los Angeles's, the flower market in San Francisco is the country's biggest—a fixture in this ever changing city for more than 70 years. Aside from the sticky-sweet smell of the wares, the traders might as well be handling auto or electronic parts.

Until the past decade cut-flower production worldwide has been carried on mostly as family business, the same farms cultivating the same flowers for generations. But Americans alone now spend nearly 15 billion dollars a year on flowers and plants—about four times more than one generation ago—at 30,000 florists and 23,000 supermarkets. For the first time, flower trading has become a colossal global concern given to cutthroat competition and political battles. Flower buying by consumers has even come to involve faceless corporations where business is done over the Internet.

EARLY THIS APRIL MORNING William Zappettini, Jr., at the end of a ten-hour trading stint, flops into one of the last empty seats in the market's coffee shop. The Zappettinis are veterans in the San Francisco market: William's father began the family

AMERICANS NOW SPEND NEARLY 15 BILLION DOLLARS A YEAR ON FLOWERS AND PLANTS—ABOUT FOUR TIMES MORE THAN ONE GENERATION AGO.

farms in 1921 as a new immigrant from Italy. "It was a poor man's profession. Anyone could get into it," says Zapp, as everyone in the market knows him. For decades the family business thrived, even during the Depression in the 1930s when Americans, too poor to buy meat, still found a way to buy "a little goodness and happiness to put on the table." In the

TAKE YOUR PICK
List in hand, an early riser scrutinizes gladiolas, sunflowers, and hydrangeas on 28th Street in midtown Manhattan, heart of New York's thriving flower trade. Open as early as 3 a.m., the market supplies the city's retail florists and event planners with flowers from around the globe. What are New Yorkers buying now? "Everything," says a seller. "It's a big city with gazillions of huge events."



1960s Zapp expanded into freight distribution, shipping flowers for more than 30 California farmers to major markets nationwide. For a while he became a local radio celebrity, advising San Franciscans each morning on what they ought to buy at their local florists. He says he was trying to encourage people to use flowers as they did in old Europe—on a daily basis, not just for special occasions.

But this is not old Europe. Like many other immigrants, the Zappettinis built their California flower farms in the area that would become Silicon Valley. By the late 1980s they found themselves and their irises, snapdragons, and tulips at the epicenter of a high-tech revolution. "Everyone wanted to buy us out, so we became real estate developers," says Zapp. They dismantled their greenhouses and leased the property to technology companies. But leaving the San Francisco flower market is unthinkable, he says. "I love the market: just seeing the people, the flowers from all over the world."



Even Zapp would have to admit, however, that the market's original soul has vanished. Flowers once cultivated and sold close to home—because they could not have survived a long journey—now can travel long distances thanks to airfreight and high-tech cooling systems developed in the 1960s. Even the most delicate lily or orchid can be boxed and shipped to arrive fresh most places on Earth. Some 70 percent of cut flowers that Americans buy now are imported: Today the San Francisco market functions as a global floral mall, and Zapp trades as a wholesaler, selling 200 varieties. His flowers are as likely to come from Singapore as Santa Cruz. In today's international business it is the only way to survive in these halls. "There's no way the old, traditional family farms can compete," Zapp says.

One morning I drive across the San Francisco Bay to Richmond to meet Lina Hale. She has been up since before dawn, trimming her roses. By the time I arrive, she is in the packing

sheds, planning that night's delivery to the market. The greenhouses, set along a quiet street on the edge of town, look much like they did decades ago, when Hale's father moved the family farm from Berkeley, where her great-grandfather began the business in 1899.

For years the greenhouses contained an unbroken sweep of roses—mainstays in the San Francisco market. Then in the early 1980s Hale's father visited Bogotá to take a look at Colombia's new flower industry. When he returned, he told his daughter: "I see a freight train coming down the track, and it's coming straight toward us."

Her father was right. In 1991 Congress passed the Andean Trade Preference Act, authorizing exemptions for Colombian and Ecuadorian cut flowers from U.S. import tariffs. Today about 45 percent of roses sold in the U.S. come from Colombia. Lina Hale and other family members have flown repeatedly to Washington, D.C., to testify about the



LIVING RAINBOW A man helps tend six million tulips at Keukenhof in the



Netherlands. "We are the display window of the bulb industry," says designer Henk Koster.

collapsing California rose industry, arguing that besides jeopardizing their livelihood, the law is a failure. "It was meant to discourage Colombia from producing drugs," says Hale bitterly. "But has it worked? Of course not."

Hundreds of California's rose farms shut down during the 1990s alone. In 1996 Bill Sakai closed his largest rose-growing facility—begun by his father in 1950 east of San Francisco—and sold the property. Then, with only two and a half acres of greenhouses left, Sakai did something his father would never have contemplated. He hired a marketing manager to help him stay in business.

The first advice his marketing manager had was to reduce the number of roses Sakai grew. In addition to the millions of Colombian and Ecuadorian roses flooding American markets, small Indian and African farmers were

AALSMEER IS AN AUCTION HOUSE IN THE SENSE THAT SHANGHAI IS A CITY OR EVEREST A MOUNTAIN. ITS SCALE IS DAUNTING.

beginning to ship roses abroad. If someone had told Sakai's father he should abandon his roses, it would have been like telling Mozart he ought to switch to jazz—unimaginable. "Our parents taught us that roses would never go out of style. But I saw we had to bring different stuff to the San Francisco market. We began to grow gerberas, lilies, and sunflowers."

Those decisions, says Bill, helped save the business. The Sakai greenhouses, a lot smaller now, are making money. As we walk around the nursery, Bill stoops to yank up some calla lilies that are grown in the muddy ditch beside one of the greenhouses. "We used to ignore these," he says. "Now they fetch good money in the San Francisco market. Restaurants buy them for big displays."

BUSINESSES LIKE Bill Sakai's may survive for now. But the chain from family farm to retail outlet is facing competition from large, publicly traded corporations. From concrete headquarters in major cities they can manage the growing and marketing of the carnations you send your ailing relatives.

Despite businesses sprouting worldwide, the Netherlands exports more cut flowers than any

other country. Here seven auction houses handle about 60 percent of the world's total cut-flower exports, and most of those pass through the Aalsmeer Flower Auction, about ten miles southwest of Amsterdam.

Aalsmeer is an auction house in the sense that Shanghai is a city or Everest a mountain. Its scale is daunting. About 120 soccer fields would fill its main hangar, which holds five auction halls. Nineteen million cut flowers are sold here on an average day, in about 40,000 transactions. Every night truckloads of flowers arrive, driven from around Europe or flown from across the world to Schiphol International Airport, a 15-minute drive away. Before dawn buyers begin zipping around the giant floor on bicycles to inspect the wares. By 6:30 the trading begins, and flowers head to loading docks to depart for cities around the world. By noon the Aalsmeer halls are silent and almost empty.

When I visited Terra Nigra, one of the Netherlands' biggest rose breeders, Marcel van Bruggen, a rose specialist, coached me through a morning auction. More important even than how his competitors were faring, he explained, was which varieties were drawing high prices. At least 30 of the several hundred different varieties of roses for sale that morning were developed in Terra Nigra's greenhouses, a few miles up the road. Like all rose-breeding companies, Terra Nigra collects a royalty—sometimes as high as a dollar—on every plant of each of its varieties farmed anywhere in the world. Marik van Wijk, who heads Aalsmeer's marketing analysis department, told me there is a frenzy to create new varieties. "There is a point of saturation on the consumer side," said van Wijk. "We need new, new, new things all the time." So the Dutch have become master breeders, fussing over each potential new variety as though it were a Rembrandt painting. If just one makes it big at the auction, thousands of farmers could choose to plant it. Fortunes can be made on a single winner.

In the auction room that morning Edith Piaf, a cherry-colored rose with deeply curved petals, appeared on one of the hundreds of carts wheeling along the track that runs across the room. Then Black Beauty, as lush and crimson as an opera-house curtain. After that Papillon, the creamy yellow of French mayonnaise. And finally Grand Prix. Van Bruggen sat up.



BUSINESS IS BLOOMING Turnstile of the global flower trade, the Aalsmeer Flower Auction (above) fills with buyers each morning. Nineteen million flowers pass through the auction's mammoth halls every 24 hours.





FLOWER POLICE Luis Armando Ramirez, center, examines an insect found in a shipment at Miami International Airport, primary entry point for flowers coming to the U.S. Agricultural agents check for endangered flower species and harmful pests.

Grand Prix is a recent Terra Nigra variety and one of its brightest new hopes: a deep red rose with slightly spiky petals that give the flower head a star shape. But Grand Prix's real value is its toughness. Van Bruggen claimed that it does not need the dazzling light of California or Colombia to grow and that it can last 12 days in a vase. It is one of the first roses Terra Nigra is trying to get traders to promote by name, in

IN 1999 COLOMBIA AND ECUADOR ALONE SHIPPED ABOUT 134,000 TONS OF FLOWERS, WORTH ABOUT 470 MILLION DOLLARS, THROUGH MIAMI.

the hope that people might one day walk into a store, and ask for "a dozen Grand Prix."

The auctioneer stopped by van Bruggen's seat during the coffee break and told him that Grand Prix could go to three guilders (about \$1.20) a stem. Van Bruggen whistled. "That's

an incredible price!" he said, and then he laughed: "It's only because the French are celebrating Mother's Day this weekend. But who cares?" At that price, farmers looking for a hardy, high-priced rose for their greenhouses might choose Grand Prix. If so, Terra Nigra's royalties could reach millions of dollars.

That might seem like a whopping sum, but it takes years to develop a new flower variety. The previous day van Bruggen had shown me Terra Nigra's breeding greenhouses near Aalsmeer: hundreds of rows of crossbred blossoms, each scrutinized repeatedly for flaws. Of the 20,000 crosses Terra Nigra breeders plant each year, only 2,000 are selected to be propagated for the second year, and 200 for the third. By year four, a handful are left to test in the market.

Although the Netherlands exported more than three billion dollars' worth of flowers in 1999, the geographic truth is that the Netherlands is smaller and does not have as favorable a climate year-round as does Ecuador, California, Colombia . . . or in fact, almost any other

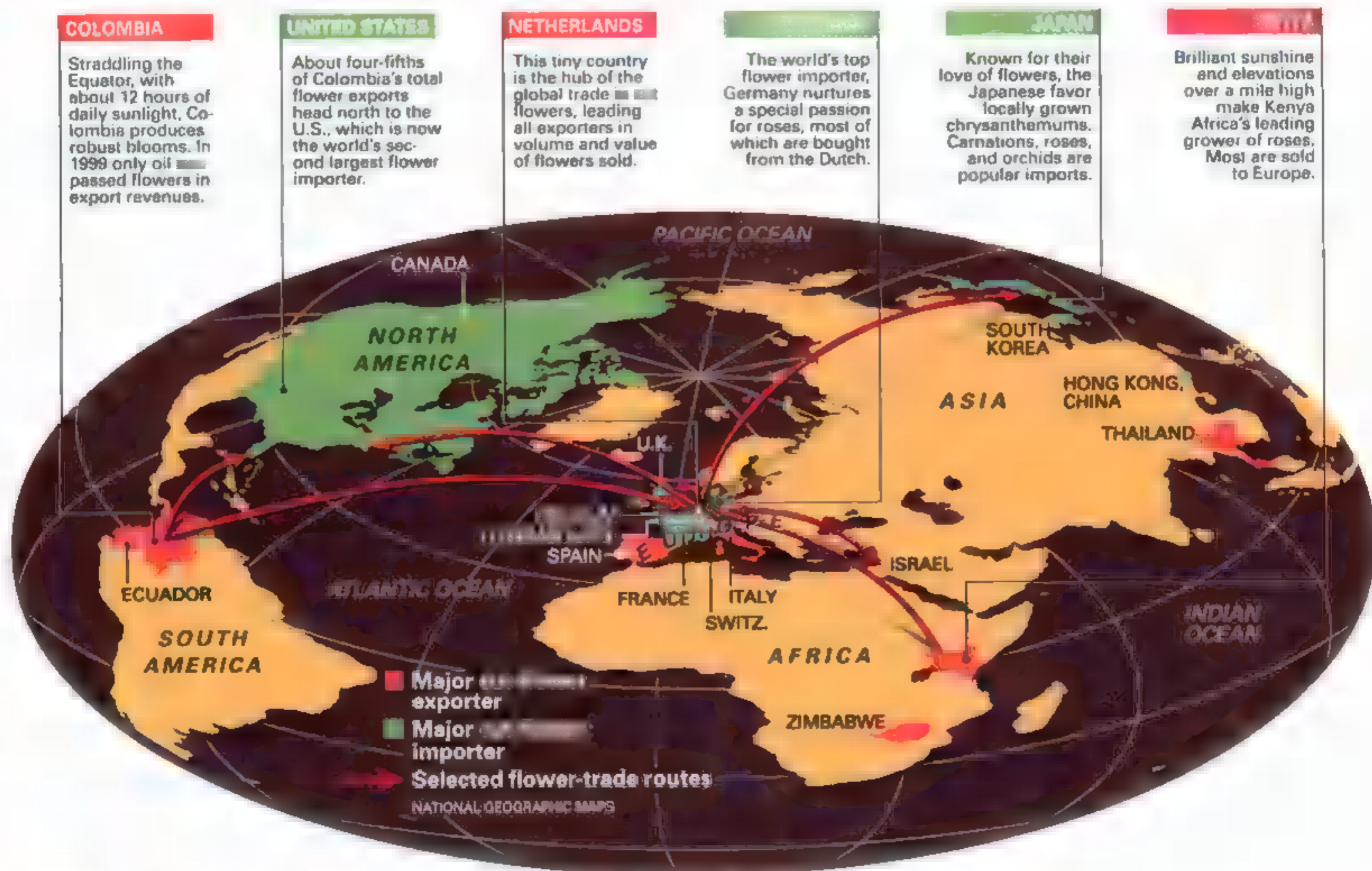
flower-growing region on the planet. Terra Nigra now has greenhouses in California and Ecuador, and its Dutch competitors have built farms in Zimbabwe, Kenya, Israel, and elsewhere. At the same time Dutch growers compete with small independent businesses popping up everywhere, aided by easy air travel and the Internet. At Aalsmeer I met Manish Mishra from India, who started rose farming fresh out of university in 1996 "because it seemed a cool thing to do." He barely knew a tulip from a freesia at the time, but his city-kid ignorance did not stop him from raising enough money to build a four-acre farm and ship his roses to Aalsmeer.

Hoping to stave off the inevitable, private companies and the Dutch government have invested millions in research laboratories, where scientists find ways to lengthen a flower's

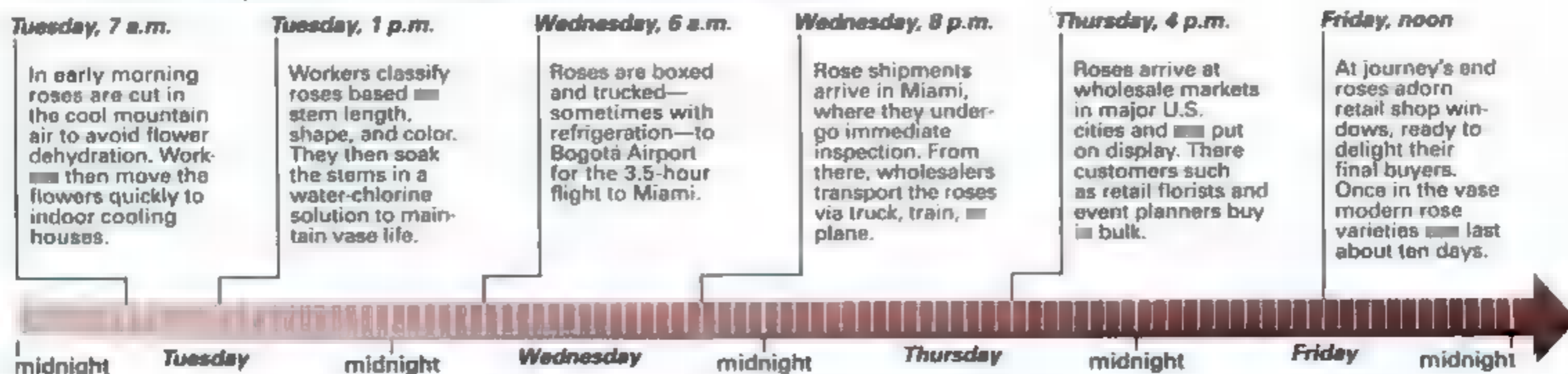
vase life or keep it from bruising while in transit on bumpy roads or strengthen its fragrance. "But breeding new varieties is, above all, the basis for our future growth," says Aalsmeer's van Wijk. "It is the surest way for Dutch expertise to retain its top spot in the world market. If we fail to come up with the new varieties, it will be the end of Holland's position."

M IAMI INTERNATIONAL AIRPORT, with its vast cooling rooms, is less than a four-hour flight from Latin American greenhouses. It has become the gateway and primary inspection station for flowers entering the United States. In 1999 Colombia and Ecuador alone shipped about 134,000 tons of flowers, worth about 470 million dollars, through Miami.

At three o'clock one January morning, I



Time Chart of Optimum Rose Shipment: Colombia to U.S.





FLIGHT OF FANCY Long conveyors move gerberas through a Dutch greenhouse.



"Daisies hate wet feet," says a grower, who adds rice hulls to plant mixes for drainage.

strap myself into a jump seat in the cockpit of a cargo plane leaving Miami for Ecuador. As we head south over the Caribbean, sunrise illuminates the northern coast of South America—and a sight that would make California farmers like Bill Sakai and Lina Hale wince: On sunny expanses of farmland stand row upon row of oblong greenhouses—filled with roses.

Waiting on the tarmac in the Quito airport are thousands of flower boxes neatly piled and labeled—roses, irises, lilies, sunflowers, carnations, orchids—ready to fly to Miami. Amid the boxes I find 26-year-old Rodrigo Aguilar, whose family began flower farming 15 years ago. “Like many people we had little *fincas*, family farms, outside Quito with nothing on them,” he says. “Then we heard about flowers and started growing them. Now we have a good business exporting sunflowers.”

In downtown Quito, I meet Mauricio Dávalos, credited with starting Ecuador’s flower industry some 20 years ago. A burly man with a big laugh, Dávalos knew nothing about flowers when he graduated from Vanderbilt University with a Ph.D. in economics in the 1970s, but he had heard about the flower boom in Colombia. “No one had experience in Ecuador,” he says. “Nothing was available here. We had to fly in everything, even cardboard boxes to pack the flowers in.”

FRAGILE CARGO

Packed like sardines (though far prettier), gerberas ■■■ boxed at a Dutch nursery. A water-and-chlorine rinse enables three-day travel out of water. Californians Michaele Thunen (below, at right) and Cherie Trombley carefully craft a portrait for a mail-order catalogue. “These things wilt fast under the lights,” says Thunen. Perfection is vital in print: Droopy blooms don’t sell.





As it turned out, that didn't matter because Dávalos had nature on his side. His roses seemed to spring up of their own accord. In fact, Ecuador is almost ideal for growing flowers. The cold Peru and warm Panama Currents offshore and the central Andes Mountains "together create virtually every microclimate imaginable," says Dávalos, "allowing us to grow a tremendous number of seasonal flowers year-round." The seasonal shifting of the currents to the north and south brings predictable rainy periods. And Ecuador has the advantage of receiving about 12 hours of sunlight each day. Roughly 16,000 species of vascular plants now grow in Ecuador—about the same number as in all of North America—including some 3,300 orchids.

Ecuador's roses quickly became popular among flower dealers for their large heads and long stems, which inspired scores of growers to build greenhouses in Ecuador, many for major Dutch and Colombian companies.

Ecuador's flower industry has brought indisputable benefits. Even when the rest of the country's economy collapsed in the late 1990s, the flower business stayed strong. The town of Cayambe, about 60 miles north of Quito up a twisting mountain pass, was a sleepy ranching town until about 1990. When I visited in January 2000, Cayambe was virtually the only place in the country where people had not lost jobs. Some 40 companies have greenhouses here, covering about a thousand acres.

It is not hard to find people in Cayambe who complain of headaches, stomach pains, and other ailments, many of which the local politicians and Cayambe's medical director blame on the use of chemicals in the greenhouses. When I visited Ivan Bahamonde, assistant general manager of Inlandes, Ecuador's biggest independent rose producer, he took care to explain the company's safety features. "We have health insurance and 24-hour medical care," he said, as we stood watching a



group of women pack long-stemmed red roses headed for that afternoon's flight to Miami. "Everyone wears masks and protective gear when we spray the plants."

Today, with more than 300 acres, Inlandes employs a thousand workers from surrounding villages, and even those who complain about possible harm from chemicals say they have money they never dreamed of before. The wages are a bargain for the big flower companies, and they have transformed lives here. In the village of Santa Marianita near Cayambe, 24-year-old Segundo Rogelio Toapanta earns a hundred dollars a month picking flowers for

an Ecuadorian grower, nearly double what he was earning the year before at construction sites in Quito. Yolanda Quishpe, 20, who picked roses for four years, says she quit

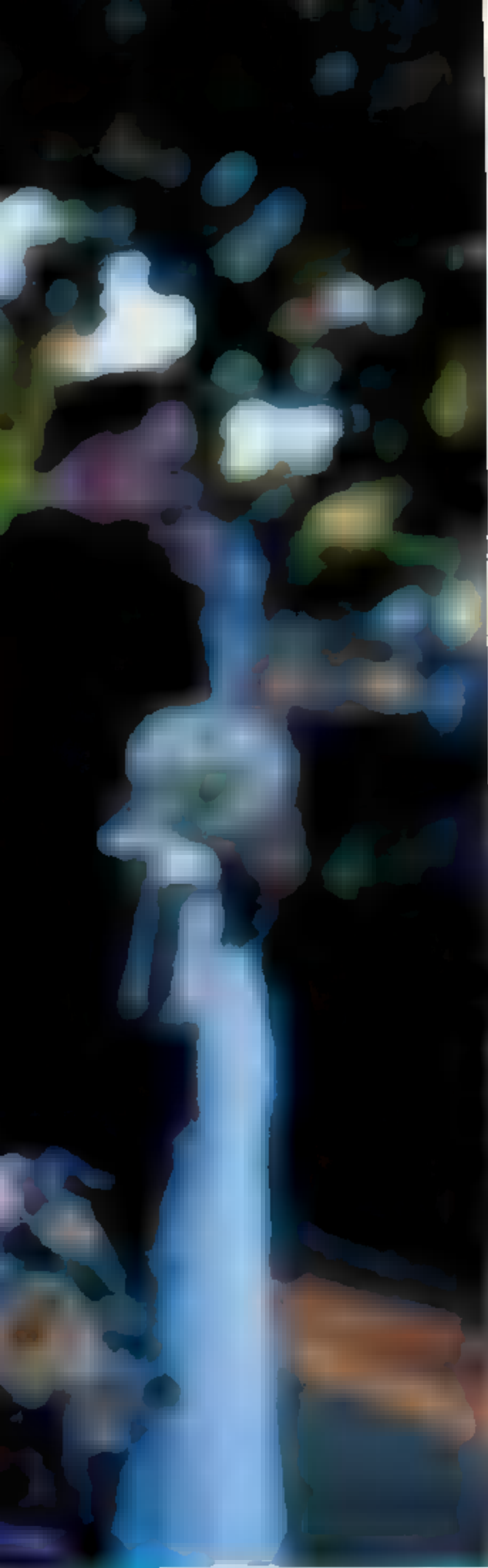
because of bad headaches, but the flower farms have brought a windfall for her and her neighbors. "My family has TV now," says Quishpe. "There are radios. Some people have remodeled their houses."

SOME OF ECUADOR'S leading flower producers fear the good times could end. Just as Lina Hale's father foresaw the Colombian threat in the early 1980s, Ecuadorians fear what is happening in Africa and Asia. "Our biggest edge is nature—our roses are the best in the world. But the Dutch are investing heavily in places like Kenya and Zimbabwe," says Dávalos. Nature may not be enough.

So who will the survivors in the flower trade be? Dávalos believes there is room for diversity. There is a place in the global market for big Dutch companies, which invest both in breeding and in new, sunny farms outside Europe. And a place, too, for small producers, whose inexpensively run farms can turn out many

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Find more flowers from Sisse Brimberg, read tales of life on assignment, and decorate your own desktop with April blooms online at nationalgeographic.com/ngm/0104.



JOY AND GRIEF
A bouquet of Charles Austin roses complements Kathryn Storke's serene gaze at her sister Abigail Paulsen's wedding in California. Symbols of life, flowers comfort the living and honor the dead (below) one year after the shooting tragedy at Columbine High School in Colorado. "Flowers help tell a story," says Paulsen. "They bring people together."

beautiful crops without a crippling investment.

Back in Miami I have breakfast with Gerry Geddis, who is a founder of the Gerald Stevens company. He believes the company can play a role in the industry's future by creating the world's first national retail brand name for flowers. Geddis's company is located in Fort Lauderdale, a short drive from Miami's cargo terminals. It is modeled after Blockbuster, the mammoth video-rental company of which Geddis was a president for several years. "When we began Blockbuster, there were 25,000 video stores in the U.S. and not a single national brand," he says. "There are tens of thousands of flower shops too but no national brand name." The company had already bought 250 florist shops in the 14 months before we met. But as a measure of how complex the flower industry is, the company has also incurred significant losses since it was founded in 1998.

Whether family growers will survive better than big companies might rest in the end on the businesses that buy cut flowers in bulk and distribute them across the globe quickly and economically. Such streamlining could ultimately squeeze out family farms. But until then, those growers will continue to nurture their roses and lilies—a little goodness and happiness to put on the table. □





A photographer for hire snaps portraits outside the Apollo Theater. Harlem's first Starbucks looks out on two other attractions: an Old Navy billboard and a Black African hair salon. Nearby the Wilson family sells home-cooked meals. A church service dazzles the faithful on Sunday mornings.



Lookin' good in Harlem

10027

BY CHARLES E. COBB, JR. PHOTOGRAPHS BY DAVID ALAN HARVEY





I was just a boy when my father brought me to Harlem for the first time, almost 50 years ago. We stayed at the Hotel Theresa, a grand brick structure at 125th Street and Seventh Avenue, the heart of zip code 10027. Once, in the hotel restaurant, my father pointed out Joe Louis. He even got Mr. Brown, the hotel manager, to introduce me to him, a bit paunchy but still the champ as far as I was concerned.

Much has changed since then. Business and real estate are booming. Some say a new renaissance is under way. Others decry what they see as outside forces running roughshod over the old Harlem.

10027 runs up the northwest side of Manhattan, from roughly 116th Street to 133rd, stretching east from the Hudson River to Fifth Avenue. It does not embrace all or even most of Harlem, but its portion of 125th Street has come to define Harlem in many minds. The Duke Ellington-Billy Strayhorn classic "Take the A Train" meant take it to 125th for the best of Harlem life.

New York meant Harlem to me, and as a young man I visited whenever I could. But many of my old haunts are gone. The Theresa shut down in 1966. National chains that once ignored Harlem now anticipate yuppie money and want pieces of this prime Manhattan real estate. So here I am on a hot August afternoon, sitting in a Starbucks that two years ago opened a block away from the Theresa, snatching at memories between sips of high-priced coffee. I am about to open up a piece of the old Harlem—the *New York Amsterdam News*—when a tourist asking directions to Sylvia's, a prominent Harlem restaurant, penetrates my daydreaming. He's carrying a book: *Touring Historic Harlem*.

History. I miss Mr. Michaux's bookstore, his House of Common Sense, which was across from the Theresa. He had a big billboard out front with brown and black faces painted on it that said in large letters: "World History Book Outlet on 2,000,000,000 Africans and Nonwhite Peoples." An ugly state office building has swallowed that space.

Out-of-towners venture into Harlem on a double-decker bus. Urban renewal tore down a section of 125th Street and put up an office building.



10027

POPULATION: 52,800

NUMBER OF MOVIE THEATERS: 1

NUMBER OF CHURCHES: More than 100

HIGH IN AVERAGE HOUSEHOLD INCOME BETWEEN \$100,000 AND \$150,000: 77 percent

DROP IN CRIME SINCE 1993: 60 percent

UNEMPLOYMENT RATE: 7 percent

MEDIAN MONTHLY RENT: \$333

PRICES OF NEWLY RESTORED BROWN-STONES: \$654,000 to \$710,000

I miss speakers like Carlos Cooks, who was always on the southwest corner of 125th and Seventh urging listeners to support Africa. Harlem's powerful political electricity seems unplugged—although the streets are still energized, especially by West African immigrants. Parts of 116th and 125th Streets seem transplanted from Dakar, Senegal. Women braid hair outside shops. Wolof and other languages of the savanna float in the air. Like black immigrants from the South three or four generations ago, these Africans have seized opportunity wherever they could.

Hardworking Southern newcomers formed the bulk of the community back in the 1920s and '30s, when Harlem Renaissance artists, writers, and intellectuals gave it a glitter and renown that made it the capital of black America. From Harlem, W. E. B. DuBois, Langston Hughes, Paul Robeson, Zora Neal Hurston, and others helped power America's cultural influence around the world. Style counted too.

"You put on your good clothes and strolled up Seventh Avenue," says Lorraine Hale, recalling her mother's words. "Overalls and jeans," sniffs Bobby Robinson, "those were work clothes." He owns a record shop called Bobby's Happy House that pumps oldies but goodies like Gladys Knight's "Midnight Train to Georgia" and Frankie Lymon's "Why Do Fools Fall in Love" out to the sidewalk.

By the 1970s and '80s drugs and crime had ravaged parts of the community. In 1990 a surgeon at Harlem Hospital and a professor at Columbia University wrote in the *New England Journal of Medicine* that the life expectancy for men in Harlem was less than that of men in Bangladesh. Harlem had become a symbol of the dangers of inner-city life.

Now, you want to shout "Lookin' good!" at this place that has been neglected for so long. Crowds push into Harlem USA, a new shopping center on 125th, where a Disney store shares space with HMV Records, the New York Sports Club, and a nine-screen Magic Johnson theater complex. Nearby, a Rite Aid drugstore and Blockbuster also opened. Maybe part of the reason Harlem seems to be undergoing a rebirth is that it is finally getting what most people take for granted.

Harlem is also part of an "empowerment zone"—a federal designation aimed at fostering economic growth that will bring over half a billion in federal, state, and local dollars. Just the shells of once elegant old brownstones now can cost several hundred thousand dollars. Rents are skyrocketing. An improved economy, tougher law enforcement, and community efforts against drugs have contributed to a 60 percent drop in crime since 1993.

Not everyone is pleased. "Whose inner city is this?" asks Dorothy Pitman

Toddlers whose parents are in drug treatment are cared for at Hale House.



Hughes, the longtime owner of a stationery store. She ticks off her list of grievances: Bill's hardware store shut down, "because he couldn't get a loan." Georgie's Bakery is gone; Krispy Kreme has come. Dr. Parkin's eyeglass store closed to make room for retail giant Starbucks.

Despite all this, much of the traditional community remains intact, and yesterday still mixes easily with today. In front of Bobby's Happy House, a kid is listening to rap through headphones as a woman dances to Jackie Wilson's "Lonely Teardrops," lost in her memories. At Showman's, a jazz club that has been around for almost 60 years, Jim Wilson, a retired detective, is borrowing a big pot to cook greens for a reunion. "I don't have one large enough."

Harlem leaves me with so many mixed feelings that I am relieved to feel a sudden clarity at Hale House, a home for children on 122nd Street. In 1969 Lorraine Hale, then a "frustrated" public school psychologist, drove past a young woman in a drug stupor holding a wooden crate. Hale caught sight of a baby's arm sticking out of the crate. She drove back to the woman and said, "My mother will help you." Her mother, Clara Hale, a widow, had been a foster parent for years, but this was the first child she took off the streets. Since then Hale House has cared for more than 3,000 babies infected with HIV or born addicted to drugs. That first child is married now with two healthy children.

Lorraine Hale's mother died in 1992, but Lorraine continues her work. She is peppering about 25 children with words of affection one morning in a small sunlit play area. "You know, that is what they need most," she says. Like Harlem, Hale has dreams. "That's part of getting there," she says. "A goal is just dreaming with a deadline." □

■ "Amateur Night," an ■■■■■ introduces ■■■ talent at the Apollo, where Ella Fitzgerald got her start.



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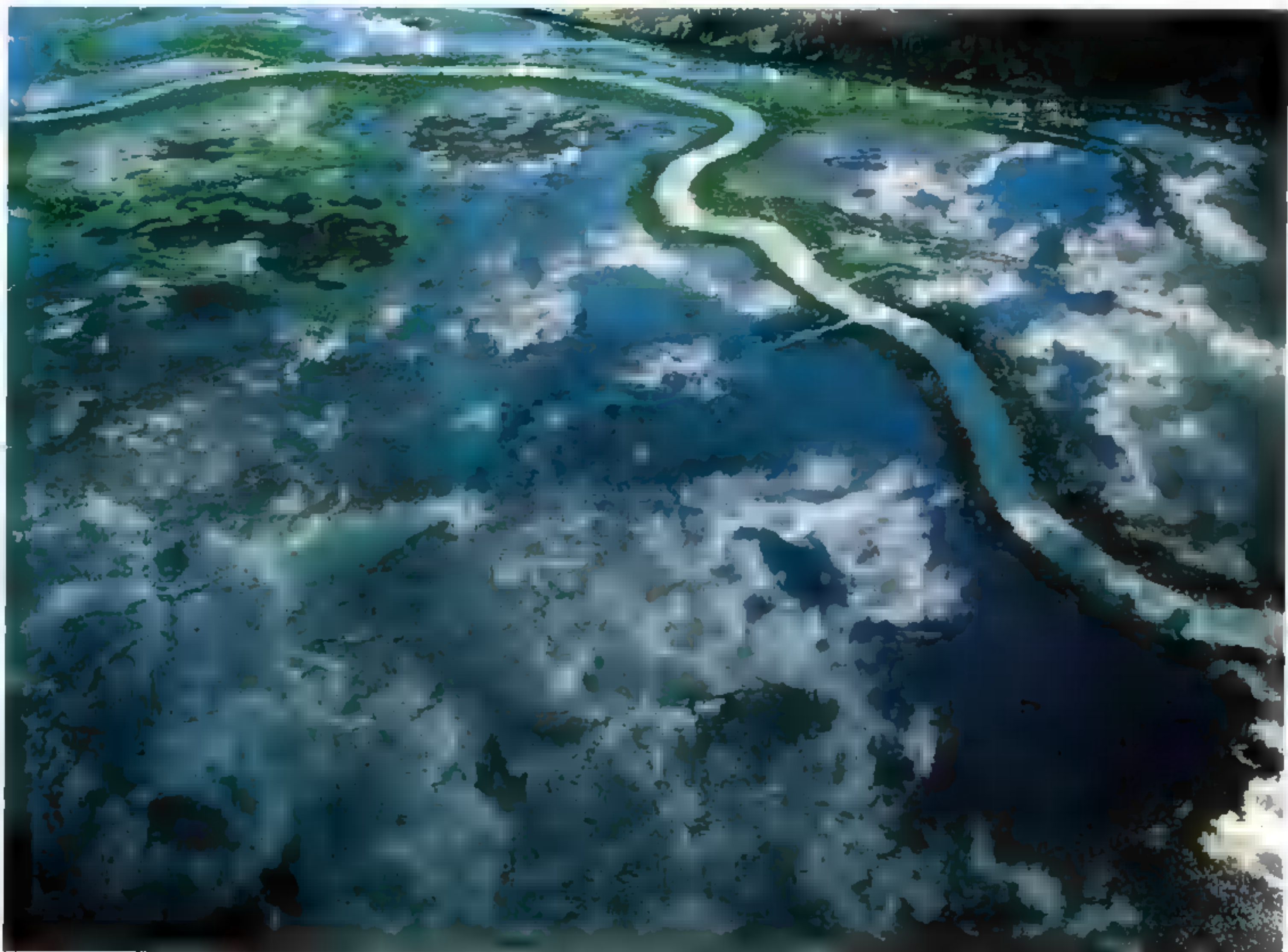


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Final Edit



JIM RICHARDSON

COLUMBIA RIVER

A River Is Born

When photographer Jim Richardson approached the source of the Columbia River, he felt a little like the 19th-century explorers who searched for the source of the Nile hoping to find something remarkable. But the tiny stream flowing from Columbia Lake looked much like dozens of other streams trickling down the valley. So he took to the air in a small plane, and within ten miles of the lake the Columbia began spilling over its banks into a natural wetland (above). "To me it had that sense of beginning," Richardson says. "An untrammelled river being what it was, not what man wanted it to be."

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ON ASSI

ON THE ROAD, IN THE FIELD,



MADRID, SPAIN

Still Life With Self-Image

Breaking through cultural barriers in the Gypsy world

Reflecting upon what he calls his “most difficult assignment,” photographer **Tomasz Tomaszewski** injects himself into a Gypsy street market in the Rastro district of Madrid. “I loved the charming

dress on the flamenco dancer, which was influenced by Gypsy style,” Tomasz says.

Tomasz first photographed Gypsies, or Roma, in his Polish homeland for a book nearly 20 years ago. “Today I can still

visit Gypsies in Poland and be welcomed as a friend,” he says. But that familiarity was lacking in the other nine countries where he followed the Gypsy trail. “Their code tells them to stay as far away from outsiders

GOVERNMENT

C O V E R I N G T H E W O R L D



TOMASZ TOMASZEWSKI

as possible," he notes. He broke through by stressing his genuine interest in Gypsies as people and in their culture. "And once I started taking pictures of their children, I was seen as a guy who wasn't dangerous."



CLARK (TOP), REDVISION/4SITE

POINT OF VIEW

The Peopling of Amarna

Lights! Action! Computers!

For more than a decade architect Michael Mallinson has taken the findings of British archaeologist Barry Kemp and earlier surveys at the 14th-century B.C. Egyptian site of Amarna and mapped the city, building by building, on a computer. When *GEOGRAPHIC* staffers working on "Pharaohs of the Sun" (page 34) saw the virtual town, "we were bowled over," says **Christopher P. Sloan**, our art director. "The town was waiting for us; all it needed was people." Thus began a complex and time-consuming process that "populated" the digital Amarna for two scenes that appear in the article.

Chris's team, including photographer Robert Clark, laboriously marked off a set in a London studio so that Clark could duplicate the chosen viewpoint for each scene, using a lighting scheme matching that of the computer version. Next came a carefully selected cast of 25 British men and women, from professional models to cabdrivers, who could pass for ancient Egyptians. Dressed in accurate costumes made by Egyptologist Kate Spence, they posed (top) for hours at a time over three days. Finally Chris selected parts of Clark's photographic images, which were then digitally married to the computer model to create hybrid works such as this scene (above) showing the arrival of a Mitannian ambassador at an Amarna quay.

HARLEM

Going "Home"

Charles E. Cobb, Jr., grew up in Washington, D.C., and Massachusetts, but going to Harlem for this month's ZipUSA feature represented a sort of homecoming. "Harlem was where you went when you were twentysomething, for the music, a certain kind of politics, its cultural life," says fiftysomething Charlie, at left, with photographer **David Alan Harvey**. "You'd say to somebody, 'Let's go hang out in Harlem.'"

Much has changed in Harlem,



BRIAN WILLIAMS

"but the vitality is still there," says Charlie, a former GEOGRAPHIC staffer. With Harlem native Bob Moses, a legend of

the 1960s civil rights movement in Mississippi, Charlie recently co-authored *Radical Equations: Math Literacy and Civil Rights*.

WORLDWIDE



TYLER SUZUKI/ISTOCK

Viewing the world of Columbia River salmon through a window at McNary Dam, photographer **Jim Richardson** (above) ponders the fate of a fish he calls "supremely remarkable." Jim was intrigued by the complexity of the issues surrounding the Columbia's signature species: "The people I trust, whether scientific experts or not, are the ones who admit there's no easy answer." He recalls the morning he encountered a dead fish that had spawned the night before. "I thought about what the life cycle of this fish had been, and I was

trying my darnedest to make a picture worthy of this incredible thing she had done before she died."

"I begged to do the flower story," says photographer **Sisse Brimberg**, who grew up in Copenhagen, Denmark. For this article she spent a lot of time working near her current home, San Francisco, where she lives with her husband and two teenage children. "Flowers mean a lot in all our lives, at weddings and funerals, on our dining room tables," says Sisse. "They comfort us; they give us hope."

Vivienne Walt first encountered flower traders a few years ago on her honeymoon in Bangkok, where she was "struck by this tight-knit community in the flower market that was awake while everyone else was asleep." Flower growers are quite traditional, she says,

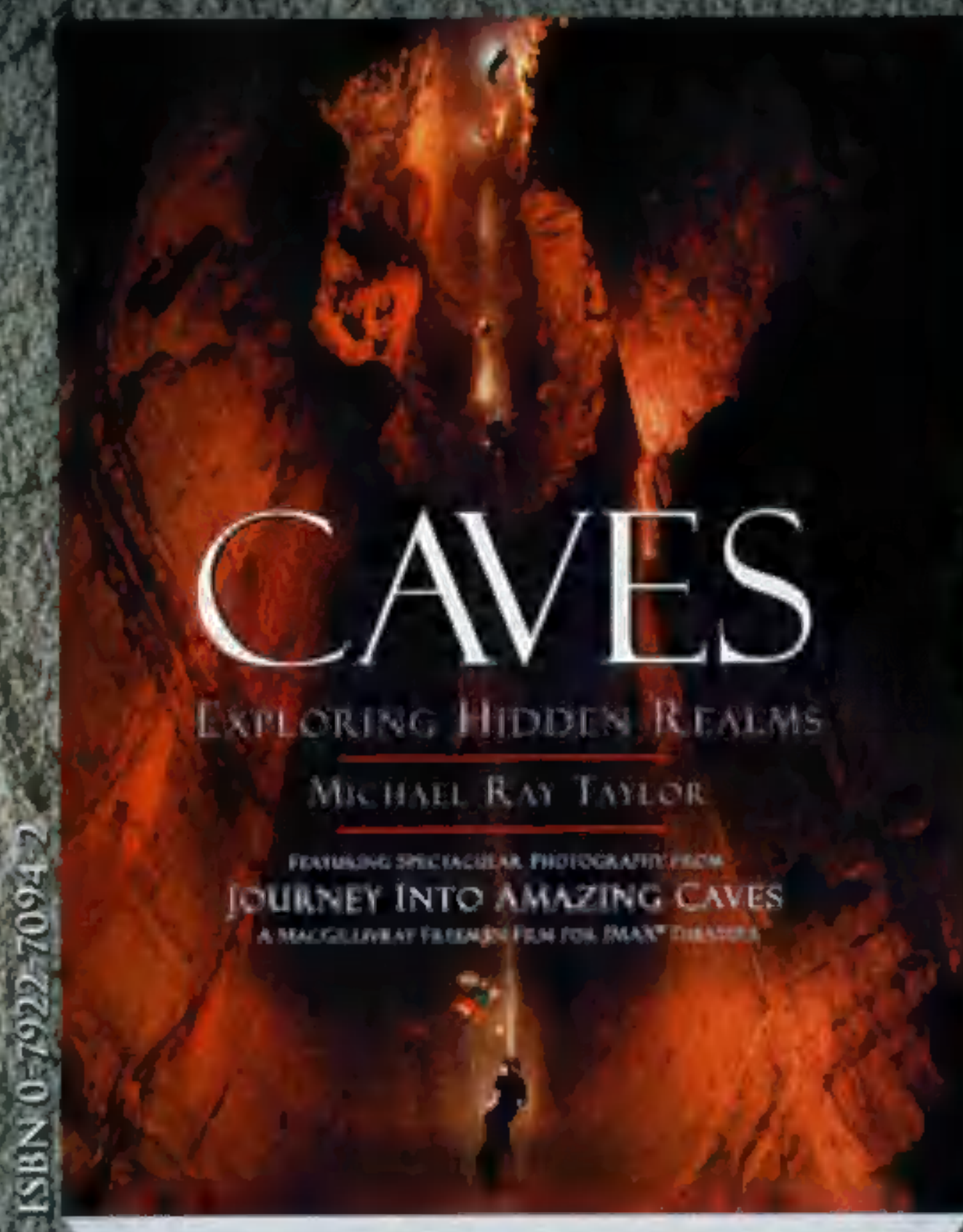
but their lives are colliding with modern global industry. A freelance writer who covers disasters—both natural and man-made—for major newspapers, Vivienne found that exploring the flower trade helped her "put things back in perspective." She lives in an apartment in the middle of Paris. "I've never grown flowers in my life," she says, "but I buy them all the time."

A third-generation diver, **Flip Nicklin** has photographed more than a dozen whale species for the magazine, including minke whales this month. He has worked with many of the world's leading marine biologists for two decades. Flip free-dives to make his photographs, using no scuba gear and thus creating no bubbles that might distract the whales. "It makes it easier for me to get into the situation without my presence changing the situation," he says.

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HARLEM

Trunk Show

The streets of New York thundered when three young elephants—stars of a vaudeville animal act—escaped from the wings of Loew's Victoria Theatre on 125th Street in Harlem. "They were finally chased by a crowd of trainers and stagehands into the West 123rd Street Police Station," claims the anonymous note on the back of the photograph, which was first published in *NATIONAL GEOGRAPHIC* in November 1930 to illustrate the article "This Giant That Is New York."

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